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CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT

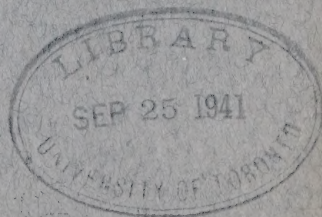
ON THE

MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

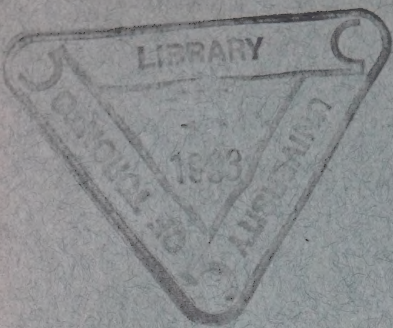
1939

Published by Authority of the Hon. James A. MacKinnon, M.P.,
Minister of Trade and Commerce



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1941

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DOMINION BUREAU OF STATISTICS
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PREFACE

The Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics issues three reports a year on the Mineral Production of Canada. The first is a preliminary estimate, which is published in mimeograph form on the first day of January following the year to which it refers. During the second week of March a preliminary printed report, containing more complete figures and in greater detail, is issued. When all returns have been received the final compilation is made and the results are presented in this report. In addition to statistics of production and external trade this report contains information on capital employed, number of employees, salaries and wages, fuel and electricity used by the mining industry, power equipment installed and other related data. Reviews covering the highlights in the industry during the year, new developments in the various mining districts of the country and such other information which may be of present interest and later of historical value are recorded.

It has been the custom for years to include world tables of Mineral Production in order to assist those who may be making international studies of production and who may not have a good reference library readily at hand. Owing to the outbreak of war in September, 1939, world figures in that year are not as complete as formerly, but world tables for 1938 with the available figures for 1939 have been included. These tables are taken from the Annual Statistical Summary of the Mineral Industry of the British Empire and Foreign Countries which is published by the Imperial Institute in London and their use here is gratefully acknowledged.

Anyone requiring information on the mineral production of Canada during earlier years is referred to the Annual Report for 1937, which contains historical tables for each metal or mineral for the Dominion, and to the 1938 report for corresponding data by provinces.

As in previous years, the Bureau co-operated with the Mines Departments of the provinces of Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and British Columbia, in the collection of these statistics. Forms are filled out in duplicate, thereby saving the operator extra work and resulting in uniform totals for the provincial and Dominion statistical bureaux.

The thanks of the Bureau are tendered to the mine and smelter operators for assistance given and information made available. Railway and other transportation companies as well as smelter operators outside of Canada have also furnished data, the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. W. H. Losee, B.Sc., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., and Mr. B. R. Hayden, of the Mineral Division staff.

R. H. COATS,
Dominion Statistician.

DOMINION BUREAU OF STATISTICS,
OTTAWA, April 3, 1941.

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DOMINION BUREAU OF STATISTICS

R. H. COATS, L.L.D., F.R.S.C., F.S.S. (Hon.), Dominion Statistician
W. H. LOSEE, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1939

CHAPTER ONE

Canadian mineral production in 1939 totalled \$474,602,059 compared with a corresponding total of \$441,823,237 in the preceding year. This represents an increase of 7·4 per cent and reflects the almost general expansion in production and new development recently experienced throughout the entire industry. The value of the 1939 output was the highest ever recorded in the history of Canadian mining. Distinct increases over 1938 were realized by all the major divisions of the industry. The value of metals and metallic ores amounted to \$343,506,123 as compared with \$323,075,154 in 1938. Coal, petroleum and other fuels totalled \$70,671,328 against \$64,803,294; asbestos, gypsum and other industrial minerals were valued at \$25,061,849, an increase of \$4,995,726, while clay products, cement, stone and other structural materials increased from \$33,878,666 in 1938 to a total of \$35,362,759.

In order of the value of their production, Ontario, Quebec and British Columbia were the leading mineral producing provinces in 1939. The values of these particular outputs were, respectively, \$232,519,948; \$77,335,998 and \$65,216,745. Production in Nova Scotia totalled \$30,746,200; Alberta, \$30,691,617; Manitoba \$17,137,930; Saskatchewan, \$8,794,090; Yukon, \$4,961,321; New Brunswick, \$3,929,433 and Northwest Territories, \$3,248,777.

Outstanding contributors of mineral wealth in the Dominion during 1939 were the gold mines and base metal mines. Canadian gold production during the year under review reached an all-time high peak of 5,094,379 fine ounces valued at \$184,115,951. The great and rapid increase in gold production and its relatively great economic importance both to the mining industry as a whole and to the nation is emphasized in a comparison of its 1939 value with the value of Canada's entire mineral output in 1922, which totalled \$184,297,242 in that particular year.

Based on preliminary statistics of world production, Canada probably ranked second as a gold producing country in 1939. High production records in base metals were established in 1939 for copper, nickel and zinc, the combined values of which aggregated \$111,855,164. Lead output at 388,569,550 pounds and \$12,313,768 represented a decrease from the preceding year's production of 418,927,660 pounds at \$14,008,941. In 1939, for the first time in several years, the commercial production of iron ore was reported; this came from the New Helen mine in the Michipicoten district of Ontario. Other interesting developments in the metal mining industries included the production of tungsten concentrates in British Columbia and the opening up of an important mercury deposit at Pinchi Lake in the same province.

The fuel industries were featured in 1939 by a continued and important increase in the production of petroleum, chiefly from Alberta wells. Coal production increased 8·7 per cent over the 1938 output. Increases were recorded in all coal producing provinces excepting Saskatchewan and Manitoba. Natural gas output was a record. The total value of all fuels produced amounted to \$70,671,328, an increase of 9·1 per cent when compared with the preceding year.

Among the more important industrial minerals, asbestos production marked an increase of 25·8 per cent over 1938; output totalled 364,472 tons valued at \$15,859,212. Other outstanding minerals in this group showing increases included gypsum, mica, sulphur and sodium sulphate. Brick and other clay products were appraised at \$5,151,236, an encouraging increase from \$4,536,084 in 1938. Other structural materials to show increases over the preceding year were cement, stone and lime.

An outstanding event in Canada's Mining History was an agreement made in 1939 by the large base metal producers and the Imperial Government by which the producers were to supply the Imperial Government with copper, lead and zinc at prices which prevailed shortly before the outbreak of the war. Canada can now furnish large quantities of these metals in the refined form, whereas in 1914 no refined copper, nickel or zinc and only a comparatively small amount of refined lead were produced in this country.

The trend in mining employment as a whole was upward in nine months of 1939, when it was in rather greater volume than in 1938, the previous maximum for this record; the annual index was 163·8, compared with 155·9 in the preceding year.

Table 1—Mineral Production of Canada, by Provinces, 1939

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
METALLICS					
Antimony.....lb.	1,200 (a)				
	\$ 148				
Arsenic (As ₂ O ₃).....lb.			(b)	1,741,917	
			(b)	52,257	
Bismuth.....lb.					
Cadmium.....lb.					73,830
					52,029
Chromite.....ton					
Cobalt.....lb.				732,561	
				1,213,454	
Copper.....lb.	1,209,179		117,238,897	328,429,665	70,458,890
	\$ 128,086		11,831,749	32,637,305	7,110,711
Gold.....fine oz.	29,943		953,377	3,086,076	180,875
(standard)	618,977		19,708,051	63,794,851	3,739,018
Estimated exchange equalization on gold produced.....\$	463,193		14,747,947	47,739,022	2,797,985
Iron ore.....short ton				123,598	
				341,594	
Lead.....lb.	2,545,122			39,130	
	\$ 80,655			1,240	
Manganese ore.....ton	4	392			
	\$ 88	3,600			
Mercury.....lb.					
Molybdenite (concentrates).....lb.			2,240	482	
			600	216	
Nickel.....lb.				226,105,865	
				50,920,305	
Palladium, Rhodium, Iridium, etc.....fine oz.				135,402	
				4,199,622	
Platinum.....fine oz.				148,877	
				5,221,712	
Radium and uranium (products).....\$					
Selenium.....lb.			23,841	126,930	
			42,175	224,539	
Silver.....fine oz.	173,877		1,167,444	4,689,422	1,028,485
	\$ 70,399		472,675	1,898,653	416,413
Tellurium.....lb.			2,940		
			4,769		
Titanium ore.....ton			3,694		
			21,267		
Tungsten concentrates.....lb.					
Zinc.....lb.	9,152,856		28,758,759		40,302,747
	\$ 280,901		882,606		1,236,891
Total Metallics.....\$	1,642,447	3,600	47,711,839	208,244,770	15,353,047

(a) In ore exported.

(b) Arsenic recovered from gold ores but not sold or shipped.

In coal mining, the index averaged 89·3, or practically the same as the 1938 figure of 90·4. The labour force of the 104 co-operating operators included 24,384 workers in 1939, as against a mean of 24,580 men employed in the 104 mines in the preceding year. The working time lost in industrial dispute in this industry was decidedly greater in 1939 than in 1938.

Employment in the extraction of metallic ores generally was greater than in 1938, or any other year for which statistics are available; the annual index, at 343·1, was 25·3 points above the average of 317·8 in the preceding twelve months. The index varied from 325·2 at January 1, to 354·4 at December 1, showing almost uninterrupted improvement during this period. The staffs of the 233 reporting firms averaged 42,548 during the year under review, compared with 38,903 in 218 mines during 1938. World monetary conditions, together with the war-time demand for Canadian metallic ores, resulted in exceptionally great activity in this division.

Non-metallic minerals, (other than coal), afforded more employment in 1939 than in 1938 or any other year since 1929. The index averaged 135·7, or 7·4 per cent above the 1938 figure of 126·3. An average payroll of 9,052 persons was employed during 1939 by the 102 co-operating firms, while those reporting in the preceding year had a mean of 8,548. Quarries and other divisions coming under this heading recorded a rather better situation.

Table 1.—Mineral Production of Canada, by Provinces, 1939

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
METALLICS						
Antimony.....lb.			1,224,385			1,225,585
			151,321			151,469
Arsenic (As ₂ O ₃).....lb.						1,741,917
						52,257
Bismuth.....lb.			409,449			409,449
			466,362			466,362
Cadmium.....lb.	66,608		799,253			939,691
	46,939		563,241			662,209
Chromite.....ton						
Cobalt.....lb.						732,561
						1,213,454
Copper.....lb.	18,133,149		73,253,408	42,382		608,825,570
	1,829,997		7,392,734	4,277		60,934,859
Gold.....fine oz.	77,120	359	626,970	51,914	87,745	5,094,379
(standard) \$	1,594,212	7,421	12,960,620	1,073,157	1,813,850	105,310,157
Estimated exchange equalization on gold produced.....\$	1,192,982	5,553	9,698,703	803,067	1,357,342	78,805,794
Iron ore.....short ton						123,598
						341,594
Lead.....lb.			378,440,666		7,544,632	388,569,550
			11,992,784		239,089	12,313,768
Manganese ore.....ton						396
						3,688
Mercury.....lb.			436			436
			1,226			1,226
Molybdenite (concentrates).....lb.						2,722
						816
Nickel.....lb.						226,105,865
						50,920,305
Palladium, Rhodium, Iridium, etc....fine oz.						135,402
						4,199,622
Platinum.....fine oz.			25			148,902
			877			5,222,589
Radium and uranium (products).....\$				1,121,553		1,121,553
Selenium.....lb.						150,771
						266,714
Silver.....fine oz.	1,141,600	32	10,648,031	483,874	3,830,864	23,163,629
	462,211	13	4,311,175	195,911	1,551,040	9,378,490
Tellurium.....lb.						2,940
						4,769
Titanium ore.....ton						3,694
						21,267
Tungsten concentrates.....lb.			8,825			8,825
			4,917			4,917
Zinc.....lb.	37,278,001		279,041,497			394,533,860
	1,144,062		8,563,784			12,108,244
Total Metallics.....\$	6,270,403	12,987	56,107,744	3,197,965	4,961,321	343,506,123

Table 1.—Mineral Production of Canada, by Provinces, 1939—Continued

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
NON-METALLICS—FUELS					
Coal.....ton	7,051,176	468,421			1,138
\$	25,611,271	1,566,359			3,110
Natural Gas.....M cu. ft.		606,382		11,966,581	600
\$		292,403		7,261,928	180
Peat.....ton				445	
\$				2,445	
Petroleum, crude.....bbl.		22,799		206,379	
\$		32,082		401,430	
Total Fuels.....\$	25,611,271	1,890,844		7,665,803	3,290
Other Non-Metallic and Industrial Minerals					
Asbestos.....ton			364,454	18	
\$			15,858,492	720	
Barytes.....ton				(a) 3,639	
\$				5	
Diatomite.....ton	279			280	
\$	9,661				
Feldspar.....ton			5,399	7,061	40
\$			60,923	51,056	330
Fluorspar.....ton				240	
\$				4,995	
Graphite.....\$				61,684	
Grindstones (includes pulpstones, etc.).....ton	152	152			
\$	5,616	9,662			
Gypsum.....ton	1,298,618	29,765		59,440	15,961
\$	1,340,830	134,286		260,792	98,578
Iron Oxides (Ochre).....ton			5,465		
\$			82,501		
Magnesitic-dolomite.....\$			474,418		
Magnesium sulphate.....ton					
\$					
Mica (all grades).....lb.			867,396	1,127,960	
\$			122,243	22,978	
Mineral waters.....Imp. gal.			104,629	19,140	
\$			17,503	1,602	
Nepheline-syenite.....\$				(b) 140,148	
Phosphate.....ton			157		
\$			1,712		
Quartz.....ton	10,574		104,827	1,333,342	
\$	18,927		369,172	665,148	
Salt.....ton	47,885			370,843	2,453
\$	213,029			2,200,189	35,888
Silica brick.....M	1,890			603	
\$	75,212			49,595	
Soapstone (†).....\$			(c) 41,471		
Sodium carbonate.....ton					
\$					
Sodium sulphate.....ton					
\$					
Sulphur (x).....ton			61,476	16,126	
\$			275,951	161,260	
Talc.....ton				13,144	
\$				128,595	
Total Other Non-Metallics.....\$	1,663,275	143,948	17,304,386	3,752,681	134,796

(x) Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and elemental sulphur made from waste smelter gases. (†) Includes some talc.

(a) Data not available for publication. (b) Quantity shipped in 1939 totalled 30,766 tons. (c) Quantity shipped in 1939 totalled 5,097 tons. (d) Ground mica schist produced in British Columbia is not included in this total.

Table 1.—Mineral Production of Canada, by Provinces, 1939—Continued

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
Non-Metallics—Fuels						
Coal.....ton	959,595	5,519,208	1,537,905			15,537,443
.....\$	1,255,142	14,415,281	5,464,061			48,315,224
Natural Gas.....M cu. ft.	96,423	22,513,660		1,500		35,185,146
.....\$	36,640	4,915,821		335		12,507,307
Peat.....ton						445
.....\$						2,445
Petroleum, crude.....bbl.		7,576,932		20,191		7,826,301
.....\$		9,362,363		50,477		9,846,352
Total Fuels.....\$	1,291,782	28,693,465	5,464,061	50,812		70,671,328
Other Non-Metallic and Industrial Minerals						
Asbestos.....ton						364,472
.....\$						15,859,212
Barytes.....ton						(a) 3,639
.....\$						301
Diatomite.....ton			17			10,388
.....\$			447			12,500
Feldspar.....ton						112,309
.....\$						240
Fluorspar.....ton						4,995
.....\$						61,684
Graphite.....\$						304
Grindstones (includes pulpstones, etc.)...ton						15,278
.....\$						1,421,934
Gypsum.....ton			18,150			1,935,127
.....\$			100,641			6,015
Iron Oxides (Ochre).....ton			550			88,418
.....\$			5,917			474,418
Magnesitic-dolomite.....\$						550
Magnesium sulphate.....ton			550			9,900
.....\$			9,900			(d) 1,995,356
Mica (all grades).....lb.			(a)			(d) 145,221
.....\$			(a)			123,769
Mineral waters.....Imp. gal.						19,105
.....\$						140,148
Nepheline-syenite.....\$						157
Phosphate.....ton						1,712
.....\$						1,582,935
Quartz.....ton	134,192					1,100,214
.....\$	46,967					424,500
Salt.....ton		3,319				2,486,632
.....\$		37,526				2,493
Silica brick.....M						124,807
.....\$						41,471
Soapstone (†).....\$						300
Sodium carbonate.....ton			300			2,400
.....\$			2,400			71,485
Sodium sulphate.....ton	71,455	30				628,151
.....\$	627,965	186				211,278
Sulphur (x).....ton			133,676			1,668,025
.....\$			1,230,814			13,144
Talc.....ton						128,595
.....\$						
Total Other Non-Metallics.....\$	674,932	37,712	1,350,119			25,061,849

Table 1.—Mineral Production of Canada, by Provinces, 1939—Concluded

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS						
CLAY PRODUCTS						
Clay—						
Fireclay.....	ton	2,522				
	\$	7,720				
Bentonite.....	ton					99
	\$					591
Other clay.....	ton				222	
	\$				666	
Brick—						
Soft mud process—						
Face.....	M	2		462	9,295	
	\$	35		5,348	160,321	
Common.....	M	233		2,683	13,863	3,716
	\$	2,412		23,285	200,089	57,152
Stiff mud process (wire cut)—						
Face.....	M	538	2,334	17,580	24,281	300
	\$	13,461	37,752	351,445	502,264	11,299
Common.....	M	4,202	3,036	27,902	12,840	83
	\$	58,581	40,322	363,852	193,970	902
Dry press—						
Face.....	M			1,897	8,385	
	\$			48,277	165,348	
Common.....	M			8,928	2,742	
	\$			142,544	39,879	
Fancy or ornamental brick.....	M				68	
	\$				4,601	
Sewer brick.....	M				217	
	\$				4,506	
Paving brick.....	M					
	\$					
Firebrick.....	M	3				
	\$	123				
Fireclay blocks and shapes.....	\$	813				
Structural tile—						
Hollow blocks.....	ton	5,385	2,377	27,230	41,856	551
	\$	50,713	19,341	235,581	329,951	5,258
Roofing tile.....	No.				110,869	
	\$				3,599	
Floor tile (quarries).....	Sq. ft.				90,292	
	\$				15,163	
Drain tile.....	M	233	43	649	12,193	76
	\$	7,512	1,588	24,876	274,846	3,690
Sewer pipe, copings, flue linings, etc.	\$	195,218		78,447	377,550	
Pottery, glazed or unglazed.....	\$		30,593		60,692	
Other clay products.....	\$	3,364	389	821	113,193	
Total Clay Products.....	\$	339,952	129,985	1,274,776	2,346,638	78,892
OTHER STRUCTURAL MATERIALS						
Cement.....	brl.			3,027,759	1,709,263	343,717
	\$			4,035,294	2,437,777	773,363
†Lime—						
Quicklime.....	ton	14,469	11,558	134,331	268,622	15,625
	\$	125,969	97,084	844,055	1,870,035	119,696
Hydrated lime.....	ton	312	7,117	26,781	33,637	4,407
	\$	3,542	54,814	139,017	366,917	76,494
Total lime.....	ton	14,781	18,675	161,112	302,259	20,032
	\$	129,511	151,898	983,072	2,236,952	196,190
Sand and Gravel.....	ton	2,139,427	3,373,303	10,050,985	9,350,875	1,363,593
	\$	1,225,827	1,363,051	2,703,032	3,537,216	514,404
*Stone—						
Granite.....	ton	885	1,492	503,011	495,619	174
	\$	20,809	72,005	1,276,859	625,880	3,544
Limestone.....	ton	17,239	52,505	1,904,658	1,931,285	35,969
	\$	33,941	142,927	1,726,653	1,624,618	80,404
Marble.....	ton			7,600	6,519	
	\$			168,612	30,642	
Sandstone.....	ton	31,711	21,412	112,403	4,124	
	\$	79,167	51,175	150,792	16,322	
Slate.....	ton			683	47	
	\$			683	649	
Total stone.....	ton	49,835	75,409	2,528,355	2,437,594	36,143
	\$	133,917	266,107	3,323,599	2,298,111	83,948
Total Other Structural Materials.....	\$	1,489,255	1,781,056	11,044,997	10,510,056	1,567,905
Grand Total, 1939.....	\$	30,746,200	3,949,433	77,335,998	232,519,948	17,137,930
Grand Total, 1938.....	\$	26,253,645	3,802,565	68,965,594	219,801,994	17,173,002

† Includes crucibles.

* Includes relatively large quantities used as a chemical.

(a) Not including value of radium and uranium.

Table 1.—Mineral Production of Canada, by Provinces, 1939—Concluded

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS						
CLAY PRODUCTS						
Clay—						
Fireclay.....ton	6,931		592			10,045
\$	15,020		8,084			30,824
Bentonite.....ton		889				988
\$		2,850				3,441
Other clay.....ton	2,892					3,114
\$	8,746					9,412
Brick—						
Soft mud process—						
Face.....M		99	1,069			10,927
\$		2,566	14,106			182,376
Common.....M	25	2,360	3,771			26,651
\$	300	35,413	53,465			372,116
Stiff mud process (wire cut)—						
Face.....M	324	216	420			45,993
\$	8,076	3,010	14,389			941,696
Common.....M	546	1,431	1,075			51,115
\$	5,260	12,344	16,993			692,224
Dry press—						
Face.....M	87	1,681	212			12,262
\$	2,997	17,151	8,745			242,518
Common.....M		6,121				17,791
\$		53,874				236,597
Fancy or ornamental brick.....M						68
\$						4,601
Sewer brick.....M						217
\$						4,506
Paving brick.....M			157			157
\$			6,089			6,089
Firebrick.....M	474	30	1,824			2,331
\$	26,300	1,297	91,626			119,346
Fireclay blocks and shapes.....\$	73,990		20,453			95,256
Structural tile—						
Hollow blocks.....ton	790	4,989	2,942			86,120
\$	7,835	37,952	27,660			714,291
Roofing tile.....No.			37,422			148,291
\$			1,365			4,964
Floor tile (quarries).....Sq. ft.			520			90,812
\$			70			15,233
Drain tile.....M	5	77	1,084			14,360
\$	200	3,129	38,132			353,973
Sewer pipe, copings, flue linings, etc.....\$		111,476	50,517			813,208
Pottery, glazed or unglazed.....\$	50	180,017	11,360			282,712
Other clay products.....\$			8,086			25,853
Total Clay Products.....\$	148,774	461,079	371,140			5,151,236
OTHER STRUCTURAL MATERIALS						
Cement.....brl.		377,846	272,679			5,731,264
\$		744,357	520,420			8,511,211
†Lime—						
Quicklime.....ton		12,113	18,035			474,753
\$		104,772	165,036			3,326,647
Hydrated lime.....ton		386	4,816			77,456
\$		3,860	32,223			676,867
Total lime.....ton		12,499	22,851			552,209
\$		108,632	197,259			4,003,514
Sand and Gravel.....ton	1,913,995	817,168	2,284,995			31,294,341
\$	408,199	619,105	870,268			11,241,102
*Stone—						
Granite.....ton			101,214			1,102,395
\$			120,404			2,119,501
Limestone.....ton		2,888	205,045			4,149,589
\$		8,166	200,842			3,817,551
Marble.....ton		5				14,124
\$		800				200,054
Sandstone.....ton		155	6,460			176,265
\$		5,314	9,060			311,830
Slate.....ton			419			1,149
\$			5,428			6,760
Total stone.....ton		3,048	313,138			5,443,522
\$		14,280	335,734			6,455,696
Total Other Structural Materials \$	408,199	1,486,374	1,923,681			30,211,523
Grand Total, 1939.....\$	8,794,090	30,691,617	65,216,745	3,248,777	4,961,321	474,602,059
Grand Total, 1938.....\$	7,782,847	28,966,272	64,549,130	(a) 568,618	3,959,570	441,823,237

Table 2.—Quantities and Values of Mineral Products from Canadian Sources, 1938 and 1939

	1938*		1939*	
	Quantity	Value	Quantity	Value
		\$		\$
METALLICS				
Antimony.....lb.	124,560	2,200	1,225,585	151,469
Arsenic (As ₂ O ₃).....lb.	2,175,646	56,538	1,741,917	52,257
Bismuth.....lb.	9,516	9,754	409,449	466,362
Cadmium.....lb.	699,138	561,799	939,691	662,209
Cobalt.....lb.	459,226	790,913	732,561	1,213,454
Copper.....lb.	571,249,664	56,554,034	608,825,570	60,934,859
Gold valued at standard rate.....fine oz.	4,725,117	97,676,834	5,094,379	105,310,157
Estimated exchange equalization on gold produced.....		68,529,156		78,805,794
Iron ore.....short tons			123,598	341,594
Lead.....lb.	418,927,660	14,008,941	388,569,550	12,313,768
Manganese ore.....tons			396	3,688
Mercury.....lb.	760	760	436	1,226
Molybdenite concentrates.....lb.	14,000	4,500	2,722	816
Nickel.....lb.	210,572,738	53,914,494	226,105,865	50,920,305
Palladium, rhodium, iridium, etc.....fine oz.	130,893	3,677,342	135,402	4,199,622
Platinum.....fine oz.	161,326	5,196,794	148,902	5,222,589
Radium and uranium products.....(a)		(a)	(a)	1,121,553
Selenium.....lb.	358,929	622,742	150,771	266,714
Silver.....fine oz.	22,219,195	9,660,239	23,163,629	9,378,490
Tellurium.....lb.	48,237	82,967	2,940	4,769
Titanium ore.....tons	207	1,449	3,694	21,267
Tungsten concentrates.....lb.			8,825	4,917
Zinc.....lb.	381,506,588	11,723,698	394,533,860	12,108,244
Total.....		323,075,154		343,506,123
NON-METALLICS—FUELS				
Coal.....tons	14,294,718	43,982,171	15,537,443	48,315,224
Natural gas.....M cu. ft.	33,444,791	11,587,450	35,185,146	12,507,307
Peat.....tons	620	3,500	445	2,445
Petroleum, crude.....brls.	6,966,084	9,230,173	7,826,301	9,846,352
Total.....		64,803,294		70,671,328
OTHER NON-METALLICS				
Asbestos.....tons	289,793	12,890,195	364,472	15,859,212
Barytes.....tons			(a)	3,639
Diatomite.....tons	398	13,842	301	10,388
Feldspar.....tons	14,058	129,293	12,500	112,309
Fluorspar.....tons	217	3,906	240	4,995
Graphite.....tons		41,590		61,684
Grindstones.....tons	306	16,198	304	15,278
Gypsum.....tons	1,008,799	1,502,265	1,421,934	1,935,127
Iron oxides (ochre).....tons	5,821	71,769	6,015	88,418
Lithium minerals.....\$				474,418
Magnesitic dolomite.....\$		420,261		9,900
Magnesium sulphate.....tons	470	9,400	550	(d)145,221
Mica.....tons	519	80,989	998	19,105
Mineral waters.....Imp. gals	188,309	21,619	123,769	140,148
Nepheline syenite.....\$		142,737		1,712
Phosphate.....tons	208	1,886	157	1,100,214
Quartz.....tons	1,280,011	961,617	1,582,935	2,486,632
Salt (b).....tons	440,045	1,912,913	424,500	124,807
Silica brick.....M	1,788	100,403	2,493	41,471
Soapstone (c).....\$		35,038		2,400
Sodium carbonate.....tons	252	2,268	300	628,151
Sodium sulphate.....tons	63,009	553,307	71,455	1,668,025
Sulphur**.....tons	112,395	1,044,817	211,278	128,595
Talc.....tons	10,853	109,810	13,144	
Total.....		20,066,123		25,061,849
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS				
Clay Products— Total.....		4,536,084		5,151,236
OTHER STRUCTURAL MATERIALS				
Cement.....brls.	5,519,102	8,241,350	5,731,264	8,511,211
Lime (b).....tons	486,922	3,542,652	552,209	4,003,514
Sand and gravel.....tons	32,223,882	12,002,554	31,294,341	11,241,102
Stone (b).....tons	5,116,022	5,556,026	5,443,522	6,455,696
Total.....		29,342,582		30,211,523
Grand Total in Canadian Funds.....		441,823,237		474,602,059

(a) Data not available for publication.

** Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

† Metal content of concentrates exported in 1938; chiefly metal in 1939.

(b) Includes relatively large quantities used as a chemical material.

* Unless otherwise noted, all total values of mineral production from 1931 to 1939, inclusive, contain estimated exchange equalization on gold produced.

(c) Includes some talc.

(d) Ground mica schist produced in British Columbia not included.

FOREIGN EXCHANGE, 1939

(Internal Trade Branch)

Foreign exchange trading, outside of the United States, was subject to a marked increase in official control in 1939. Soon after the outbreak of hostilities in September, belligerents took action to safeguard the position of their currencies and foreign exchange reserves.

From the beginning of the year until the latter part of August, sterling rates at Montreal held comparatively steady at approximately \$4.69, being supported intermittently by the British Exchange Equalization Fund. Following withdrawal of this support sterling rates dropped to a 1939 low of \$4.1666 on September 14. Various restrictive measures were imposed by the British Treasury at this time. Rediscount rates were raised from 2 to 4 per cent by the Bank of England and limitations were placed on capital exports. Bar gold at London advanced from around 148s. 6d. in August to 168s. per fine ounce on September 5, the latter figure being a fixed buying price set by the Bank of England. About the middle of the month official sterling buying and selling rates of \$4.02-\$4.06 were set for New York funds. At the same time the Bank of England transferred practically its entire gold reserves amounting to approximately £280 millions to the Exchange Equalization Fund. On September 18, with the formation of the Canadian Foreign Exchange Control Board, sterling buying and selling rates at Montreal were set at \$4.43-\$4.47 while at New York rates were revised by the Bank of England to \$4.02-\$4.04. Rates on United States funds were set by the Canadian Foreign Exchange Control Board at \$1.10 buying and \$1.11 selling on the same date. These rates remained unchanged for the balance of the year. Prior to their establishment United States funds, which had been ruling at par in August, moved up to a 1939 peak premium of 11½ per cent on September 15. This compared with a premium of ¾ of one per cent at the beginning of the year. During the last three and one-half months of 1939, free market rates at New York for sterling generally fluctuated at levels considerably below the official rate. A low of \$3.82 ½ was touched on September 18 while a peak of \$4.05 ¼ occurred on October 4. Generally, however, free rates averaged about 10 cents below the lower official limit. During the same period Canadian funds at New York moved between a high of 91 cents on September 20 and a low of 86 cents on November 22. French francs remained linked to sterling throughout the year and reflected sterling movements. Repatriation of French gold and securities during 1939 was substantial and brought Bank of France gold reserves (measured in metric tons) to their highest level in history. Quotations on the French franc at Montreal closed the year at 2.50 cents compared with a low of 2.34 cents on September 18 and an opening level of 2.64 cents. A noteworthy event in connection with the sterling-franc relationship was the announcement on December 12 that the Governments of the United Kingdom and France had signed a financial agreement which stabilized Anglo-French currencies at the rate of 176½ francs to the £ sterling until six months after the signature of a peace treaty.

Table 3.—Exchange Quotations at Montreal, 1939

NOTE.—The noon rates in Canadian funds upon which these averages are based have been supplied by the Bank of Canada

	Sterling	U.S. Dollar	French Franc	Belgian Belga	Japanese Yen	Argentine Peso (Free rate)
1939						
January.....	4.7060	1.0079	.0266	.1703	.2742	.2311
February.....	4.7086	1.0049	.0266	.1694	.2744	.2311
March.....	4.7044	1.0041	.0266	.1689	.2742	.2316
April.....	4.7038	1.0050	.0266	.1692	.2742	.2323
May.....	4.6981	1.0036	.0266	.1708	.2738	.2323
June.....	4.6923	1.0021	.0266	.1704	.2734	.2326
July.....	4.6885	1.0015	.0265	.1702	.2733	.2320
August.....	4.6327	1.0047	.0263	.1704	.2703	.2321
September.....	†4.4090	†1.0948	.0248	.1871	.2575	.2566
October.....	†4.4500	†1.1050	.0252	.1858	.2612	.2604
November.....	†4.4500	†1.1050	.0247	.1832	.2603	.2574
December.....	†4.4500	†1.1050	.0247	.1841	.2602	.2527

† Since September 16, 1939, quotations used are the average of the daily buying and selling rate set by the Canadian Foreign Exchange Control Board. The current buying and selling rates for sterling were \$4.43 and \$4.47 and for U.S. funds \$1.10 and \$1.11.

PRICE MOVEMENTS, CANADA, 1939

(Internal Trade Branch)

The course of commodity prices in 1939 was unusually even until the middle of August. Two weeks prior to the outbreak of war, markets turned upward and basic commodities advanced steadily for seven weeks, carrying the general level of wholesale prices 8.5 per cent higher. Early in October, markets tended to level off, but wholesale price indexes continued to edge gradually upward until the beginning of December. Then, led by grains, commodities again recorded fairly broad advances.

The net advance in the general wholesale price level for 1939 was 11.5 per cent, while the increase from the year's low in August amounted to 12.8 per cent. In the retail price field, only foods and a few clothing items showed an early response to the September rise in wholesale market. Advances became more general, however, for clothing and household needs during November and December. The December cost of living index was 3.0 per cent higher than that for August and 2.3 per cent above the level of December, 1938. As the year closed, both wholesale and retail price levels were above 1938 averages. The latter have been edging irregularly upward since 1933, but December 1939 wholesale price levels were still appreciably below their 1937 peak. Both groups remained substantially below pre-depression levels of 1929.

From January to August 1939, the Dominion Bureau of Statistics' index number of general wholesale prices fluctuated narrowly between 73.7 and 72.4. Then from the latter level in August it jumped to 78.2 in September, and thereafter mounted more gradually to 82.2 in the final week of December. The net advance of 11.5 per cent during 1939 in the general index compared with the following percentage increases in component groups: Vegetable products 19.2, Animal Products 11.5, Textiles 23.3, Wood Products 11.7, Iron and Its Products 4.0, Non-Ferrous Metals 5.3, Non-Metallic Minerals 0.2, and Chemicals 9.5. Net price increases for the year for individual commodities were with few exceptions less than 25 per cent. Increases exceeding this amount, however, were recorded for raw silk, wool, grains, rubber, leather, ground-wood pulp and tin. Advances ranging from 10 to 25 per cent included cattle, granulated sugar, cheese and pig iron, while copper and gasoline moved up less than 10 per cent. Steel bars, bituminous coal and sulphuric acid showed no change, while hogs, eggs, and anthracite coal were slightly lower.

Table 4.—Average Yearly Prices for Metals, 1935-1939

Metal	Market	Unit	1935	1936	1937	1938	1939
			\$	\$	\$	\$	\$
Antimony (ordinaries).....	New York.....	Pound....	0-13616	0-12240	0-15355	0-12349	0-12359
Arsenic, white (nominal).....	New York.....	Pound....	0-035	0-035	0-03	0-03000	0-03
Copper.....	New York.....	Pound....	0-08649	0-09474	0-13167	0-1000	0-10965
	Montreal.....	Pound....	0-08488	0-10070	0-13886	0-1055	0-1077
	London.....	Long ton..	35-430	42-650	59-339	45-411	49-169
Gold (in Canadian funds).....		Fine oz...	35-19	35-03	34-99	35-175	36-141
Lead.....	New York.....	Pound....	0-04065	0-04710	0-06009	0-0474	0-0505
	Montreal.....	Pound....	0-03925	0-04642	0-05799	0-04176	0-04235
	London.....	Long ton..	14-238	17-599	23-326	15-266	15-437
Nickel.....	New York.....	Pound....	0-35	0-35	0-35	0-35	0-35
Platinum.....	London.....	Fine oz...	*7-325	*8-138	*9-811	*6-55	*7-631
Silver.....	New York.....	Fine oz...	0-64273	0-45087	0-44881	0-43225	0-39082
Tin.....	New York.....	Pound....	0-50420	0-46441	0-54337	0-42301	0-50323
Zinc.....	St. Louis.....	Pound....	0-04328	0-04901	0-06519	0-0461	0-0511
	Montreal.....	Pound....	0-03992	0-04153	0-05593	0-039	0-0468
	London.....	Long ton..	14-082	14-920	22-258	13-990	14-950

NOTE.—All prices in dollars per unit excepting London copper, lead and zinc prices which are quoted in pounds sterling per long ton.

* Prices for platinum are quoted in pounds sterling per fine ounce.

Table 5.—Metal Prices by Months, 1938 and 1939

Month	Copper (Electrolytic)				Pig Lead					
	New York (in cents per pound)		London (In £ sterling per long ton)		Montreal (In cents per pound)		New York (In cents per pound)		London (In £ sterling per long ton)	
	1939	1938	1939	1938	1939	1938	1939	1938	1939	1938
January.....	11·025	10·198	48·440	45·387	3·981	4·352	4·826	4·870	14·534	16·135
February.....	11·025	9·775	47·375	43·563	3·952	4·220	4·805	4·632	14·283	15·402
March.....	11·025	9·775	48·120	43·582	4·013	4·354	4·824	4·500	14·660	15·992
April.....	10·265	9·775	47·833	43·408	3·950	4·292	4·782	4·500	14·337	15·579
May.....	9·833	9·375	47·528	40·852	3·973	4·010	4·750	4·400	14·483	14·210
June.....	9·775	8·775	47·528	39·417	3·998	3·933	4·800	4·148	14·564	13·969
July.....	9·976	9·585	48·863	44·405	4·060	4·136	4·854	4·882	14·753	14·921
August.....	10·261	9·900	50·409	45·909	4·332	3·975	5·043	4·900	16·040	14·371
September.....	11·635	10·028	51·000	47·148	4·600	4·150	5·449	4·998	17·000	15·249
October.....	12·215	10·760	51·000	51·190	4·600	4·303	5·500	5·100	17·000	16·173
November.....	12·275	11·025	51·000	51·080	4·600	4·261	5·500	5·091	17·000	16·088
December.....	12·275	11·025	51·000	48·988	4·760	4·130	5·500	4·842	17·000	15·106
Average.....	10·965	10·000	49·169	45·411	4·235	4·176	5·053	4·739	15·437	15·266

Transposed into Canadian funds the average price of copper, based on the London market, was 9·972 cents per pound in 1938 and 10·092 cents in 1939; the average price of lead, based on the same market, was 3·344 cents per pound in 1938 and 3·169 cents in 1939.

Table 5.—Metal Prices by Months, 1938 and 1939—Concluded

Month	Silver				Zinc					
	New York (In cents per oz. ·999 fine)		London (In pence per oz. ·925 fine)		Montreal (In cents per pound)		St. Louis (In cents per pound)		London (In £ sterling per long ton)	
	1939	1938	1939	1938	1939	1938	1939	1938	1939	1938
January.....	42·750	44·750	20·305	19·895	3·769	4·102	4·500	5·000	13·682	14·994
February.....	42·750	44·750	20·370	20·159	3·800	3·987	4·500	4·813	13·522	14·408
March.....	42·750	44·446	20·280	20·088	3·828	3·987	4·500	4·417	13·728	14·364
April.....	42·750	42·750	20·031	18·880	3·755	3·863	4·500	4·141	13·443	13·729
May.....	42·750	42·750	20·123	18·731	3·790	3·679	4·500	4·042	13·717	12·682
June.....	41·955	42·750	19·505	18·945	3·854	3·712	4·500	4·131	14·023	12·890
July.....	34·944	42·750	16·952	19·356	3·921	3·988	4·516	4·745	14·235	14·144
August.....	35·951	42·750	17·719	19·389	4·041	3·834	4·719	4·750	14·628	13·467
September.....	36·956	42·750	22·178	19·300	4·300	3·888	6·104	4·846	17·250	14·040
October.....	35·726	42·750	22·736	19·613	4·500	4·073	6·500	5·012	17·250	15·083
November.....	34·750	42·750	23·378	19·834	4·500	3·907	6·500	4·924	17·250	14·366
December.....	34·956	42·750	23·263	20·083	4·760	3·780	5·980	4·500	17·250	13·709
Average.....	39·082	43·225	20·570	19·523	4·065	3·900	5·110	4·610	14·950	13·990

The average price of silver in Canadian funds based on the New York market in 1938 was 43·477 cents per fine ounce and in 1939 it was 40·488 cents.

The average price of zinc in Canadian funds based on the London market in 1938 was 3·073 cents per pound and in 1939 it was 3·069 cents.

Table 6.—Annual Values of the Mineral Production of Canada since 1886

NOTE.—In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, nickel, silver, zinc, etc., is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued chiefly at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886.....	10,221,255	2-23	1913.....	145,634,812	19-35
1887.....	10,321,331	2-23	1914.....	128,863,075	16-75
1888.....	12,518,894	2-67	1915.....	137,109,171	17-44
1889.....	14,013,113	2-96	1916.....	177,201,534	22-05
1890.....	16,763,353	3-50	1917.....	189,646,821	23-13
1891.....	18,976,616	3-92	1918.....	211,301,897	25-37
1892.....	16,623,415	3-39	1919.....	176,686,290	20-84
1893.....	20,035,082	4-04	1920.....	227,859,665	26-40
1894.....	19,931,158	3-98	1921.....	171,923,342	19-56
1895.....	20,505,917	4-05	1922.....	184,297,242	20-55
1896.....	22,474,256	4-38	1923.....	214,079,331	23-41
1897.....	28,485,023	5-49	1924.....	209,583,406	22-71
1898.....	38,412,431	7-32	1925.....	226,583,333	24-19
1899.....	49,234,005	9-27	1926.....	240,437,123	25-61
1900.....	64,420,877	12-04	1927.....	247,356,695	25-67
1901.....	65,797,911	12-16	1928.....	274,989,487	27-96
1902.....	63,231,836	11-36	1929.....	310,850,246	31-00
1903.....	61,740,613	10-83	1930.....	279,873,578	27-42
1904.....	60,082,771	10-27	1931.....	230,434,726	22-21
1905.....	69,078,999	11-49	1932.....	191,228,225	18-20
1906.....	79,286,697	12-81	1933.....	221,495,253	20-74
1907.....	86,865,202	13-75	1934.....	278,161,590	25-67
1908.....	85,557,101	13-16	1935.....	312,344,457	28-56
1909.....	91,831,441	13-70	1936.....	361,919,372	32-82
1910.....	106,823,623	14-93	1937.....	457,359,092	41-13
1911.....	103,220,994	14-32	1938.....	441,823,237	39-42
1912.....	135,048,296	18-33	1939.....	474,602,059	41-94
			Grand Total.....	8,095,147,269	*715-43

* Based on an estimated population of 11,315,000 in 1939.
NOTE.—For complete data, by minerals, see Annual Mineral Production Report for 1937.

Table 7.—Annual Values of the Mineral Production of Canada, by Classes, since 1929

Year	Metallics	Non-Metallics		Total
		Fuels and other non-metallics	Structural materials and clay products	
	\$	\$	\$	\$
1929.....	154,454,056	97,861,356	58,534,834	310,850,246
1930.....	142,743,764	83,402,349	53,727,465	279,873,578
1931.....	120,930,147	65,346,284	44,158,295	230,434,726
1932.....	112,041,763	56,788,179	22,398,283	191,228,225
1933.....	147,015,593	57,782,973	16,696,687	221,495,253
1934.....	194,110,968	64,763,861	19,286,761	278,161,590
1935.....	221,800,849	67,328,208	23,215,400	312,344,457
1936.....	259,425,194	76,723,437	25,770,741	361,919,372
1937.....	334,165,243	88,324,150	34,869,699	457,359,092
1938.....	323,075,154	84,869,417	33,878,666	441,823,237
1939.....	343,506,123	95,733,177	35,362,759	474,602,059

Table 8.—Total (Cumulative) Recorded Production in Canada of Specified Metals to December 31, 1939

		Quantity	Value
			\$
Gold.....	(a)	fine ounces	70,225,912
Silver.....	(b)	fine ounces	783,664,989
Copper.....	(c)	pounds	6,697,548,813
Nickel.....	(d)	pounds	2,805,377,739
Lead.....	(b)	pounds	6,374,120,797
Zinc.....	(f)	pounds	33,063,655
Cobalt.....	(e)	pounds	31,921,836

NOTE.—The total value of production by the entire Canadian mining industry from 1887 to the end of 1939 totalled \$8,095,147,269.
(a) Since 1858; (b) since 1887; (c) since 1886; (d) since 1889; (e) since 1904; (f) since 1893.

Table 9.—Values of the Mineral Production of Canada, by Provinces, since 1929

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon*
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1929..	30,904,453	2,439,072	46,358,285	117,662,505	5,423,825	2,253,506	34,739,986	68,162,878	2,905,736
1930..	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182	2,368,612	30,427,742	54,953,320	2,521,588
1931..	21,081,157	2,176,910	35,964,537	97,975,815	10,057,808	1,931,880	23,580,901	35,480,701	2,184,917
1932..	16,201,279	2,223,505	25,638,466	85,910,030	9,058,365	1,681,728	21,174,061	27,326,173	2,014,618
1933..	16,966,183	2,107,682	28,141,482	110,205,021	9,026,951	2,477,425	19,702,953	30,794,504	2,073,052
1934..	23,310,729	2,156,151	31,269,945	145,565,871	9,776,934	2,977,061	20,228,851	41,206,965	1,669,063
1935..	23,183,128	2,821,027	39,124,666	158,934,269	12,052,417	3,816,943	22,289,681	48,692,050	1,430,246
1936..	26,672,278	2,587,891	49,736,919	184,532,592	11,315,527	6,970,397	23,508,726	54,407,036	2,390,706
1937..	30,314,188	2,763,643	65,160,215	230,042,517	15,751,645	10,271,463	25,597,117	73,555,798	3,902,506
1938..	26,253,645	3,802,565	68,965,594	219,801,994	17,173,002	7,782,847	28,966,272	64,549,130	4,528,188
1939..	30,746,200	3,949,433	77,335,998	232,519,948	17,137,930	8,794,090	30,691,617	65,216,745	8,210,098

* Includes production from the Northwest Territories since 1932; in 1937 the value of production in the Northwest Territories totalled \$117,978 and in 1938 the corresponding value was \$568,618. Production in Northwest Territories in 1939 totalled \$3,248,777.

NOTE.—In the following provincial tables the value of gold includes the exchange equalization. For further information on the price of gold see Chapter II.

Table 10.—Mineral Production of Nova Scotia,* 1937-1939

Product	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Antimony.....	48,163	7,394	24,560	2,200	1,200	148
Copper.....	180,609	23,620	.....	.....	1,269,179	128,086
Gold.....	19,918	696,931	26,560	934,248	29,943	1,082,170
Lead.....	418,086	21,364	.....	.....	2,545,122	80,655
Manganese Ore.....	.....	.....	.....	.....	4	88
Silver.....	26,990	12,113	988	430	173,877	70,399
Zinc.....	5,485,550	268,902	.....	.....	9,152,856	280,901
NON-METALLICS—						
Coal.....	7,256,954	25,640,819	6,236,417	22,523,802	7,051,176	25,611,271
Diatomite.....	481	15,392	384	13,480	279	9,661
Grindstones.....	37	4,415	131	7,006	152	5,616
Gypsum.....	926,796	978,288	870,856	908,383	1,298,618	1,340,830
Quartz.....	11,732	14,078	4,701	8,415	10,574	18,927
Salt.....	47,865	216,401	44,950	194,759	47,885	213,029
Silica brick.....	2,926	121,146	1,193	49,811	1,890	75,212
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....	.....	406,846	.....	340,253	.....	339,952
Lime—						
Quicklime.....	17,289	145,737	11,926	107,202	14,469	125,969
Hydrated lime.....	398	4,378	425	3,446	312	3,542
Sand and gravel.....	2,992,429	1,457,266	2,077,378	1,013,266	2,139,427	1,225,827
Stone.....	178,721	279,098	63,662	146,944	49,835	133,917
Total.....		30,314,188		26,253,645		30,746,200

* In 1937, 320,318 long tons of pig iron were produced in Nova Scotia from Newfoundland ores; production in 1938 totalled 241,856 long tons and in 1939—259,136 long tons.

Table 11.—Mineral Production of New Brunswick, 1937-1939

	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Manganese ore.....	85	817	.....	.....	392	3,600
NON-METALLICS—						
Coal.....	364,714	1,180,611	342,238	1,133,346	468,421	1,566,359
Grindstones.....	288	12,139	175	9,192	152	9,662
Gypsum.....	36,906	131,727	48,418	159,203	29,765	134,286
Natural gas.....	576,671	289,922	577,492	284,689	606,382	292,403
Petroleum.....	18,089	25,496	19,276	27,246	22,799	32,082
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....	.....	123,876	.....	123,625	.....	129,985
Lime—						
Quicklime.....	11,630	90,067	9,638	77,149	11,558	97,084
Hydrated lime.....	8,269	60,295	5,609	42,407	7,117	54,814
Sand and gravel.....	1,136,013	715,652	3,833,540	1,825,383	3,373,303	1,863,051
Stone.....	57,468	139,041	13,279	120,325	75,409	266,107
Total.....		2,763,643		3,802,565		3,949,433

Table 12.—Mineral Production of Quebec, * 1937-1939

Product	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Chromite..... tons	210	3,286				
Copper..... lb.	94,653,132	12,378,737	112,645,797	11,233,039	117,238,897	11,831,749
Gold..... fine oz.	711,480	24,894,685	881,263	30,998,426	953,377	34,455,998
Lead..... lb.	1,521,182	77,732				
Molybdenite concentrates..... lb.					2,240	600
Selenium..... lb.	208,531	360,759	217,952	378,147	23,841	42,175
Silver..... fine oz.	908,590	407,784	1,189,495	517,157	1,167,444	472,675
Tellurium..... lb.	26,439	45,739	41,577	71,512	2,940	4,769
Titanium ore, sold for export..... tons	4,229	26,432	207	1,449	3,694	21,267
Zinc..... lb.	8,566,927	419,951	5,315,852	163,356	28,758,759	882,606
NON-METALLICS—						
Asbestos..... tons	410,025	14,505,541	289,793	12,890,195	364,454	15,858,492
Feldspar..... tons	12,285	105,612	5,874	62,878	5,399	60,923
Iron oxides (ochre)..... tons	5,617	77,640	5,387	67,209	5,465	82,501
Magnesitic dolomite.....		677,207		420,261		474,418
Mica..... tons	546	124,594	218	72,982	434	122,243
Natural mineral waters..... Imp. gal.	198,319	19,697	159,893	19,033	104,629	17,503
Phosphate..... tons	100	900	208	1,886	157	1,712
Quartz..... tons	127,535	448,327	85,153	315,251	104,827	369,172
Soapstone†.....		40,513		35,038		41,471
Sulphur..... tons	28,534	194,496	16,580	98,261	61,476	275,951
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	2,578,623	3,537,798	2,730,320	3,693,188	3,027,759	4,035,294
Clay products.....		1,053,153		1,022,194		1,274,776
Lime—						
Quicklime..... tons	118,040	778,216	109,706	707,481	134,331	844,055
Hydrated lime..... tons	38,273	130,900	27,608	135,850	26,781	139,017
Sand and gravel..... tons	9,476,000	2,637,495	12,523,404	3,532,873	10,050,985	2,703,032
Stone..... tons	1,958,396	2,213,021	2,196,384	2,527,928	2,528,355	3,323,599
Total.....		65,160,215		68,965,594		77,335,998

* There is also in this province an important production of aluminium from imported ores.

† Includes some talc.

Table 13.—Mineral Production of Ontario,* 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃).....lb.	1,389,426	41,032	2,175,646	56,538	1,741,917	52,257
Bismuth.....lb.	5,711	5,654	9,516	9,754		
Chromite.....tons		39,964				
Cobalt.....lb.	507,064	848,145	459,226	790,913	732,561	1,213,454
Copper.....lb.	322,039,208	41,716,364	309,030,106	30,405,500	328,429,665	32,637,305
Gold.....fine oz.	2,587,095	90,522,454	2,896,477	101,883,578	3,086,076	111,533,873
Iron ore.....short tons					123,598	341,594
Lead.....lb.	29,840	1,525	22,363	748	39,130	1,240
Molybdenite (concentrates).....lb.	16,008	8,147	14,000	4,500	482	216
Nickel.....lb.	224,790,974	59,469,423	210,572,738	53,914,494	226,105,865	50,920,305
Palladium, rhodium, etc.....fine oz.	119,829	3,179,782	130,893	3,677,342	135,402	4,199,622
Platinum.....fine oz.	139,355	6,751,750	161,310	5,196,279	148,877	5,221,712
Selenium.....lb.	116,696	201,884	54,577	94,691	126,930	224,539
Silver.....fine oz.	4,693,047	2,106,286	4,318,837	1,877,701	4,689,422	1,898,653
Tellurium.....lb.	6,651	11,506				
Zinc.....lb.	120,011	5,883				
NON-METALLICS—						
Asbestos.....tons	1	250			18	720
Barytes.....tons						3,639
Diatomite.....tons	38	1,868			5	280
Feldspar.....tons	9,061	72,610	8,106	65,964	7,061	51,056
Fluorspar.....tons	150	2,550	217	3,906	240	4,995
Graphite.....tons		125,343		41,590		61,684
Gypsum.....tons	53,780	233,895	57,503	242,470	59,440	260,792
Mica.....tons	399	9,137	253	6,445	564	22,978
Natural mineral waters.....Imp. gal.	26,700	889	28,416	2,586	19,140	1,602
Natural gas.....M cu. ft.	10,746,334	6,588,798	10,952,806	6,460,764	11,966,581	7,261,928
Nepheline syenite.....\$		121,481		142,737		140,148
Peat.....tons	478	2,676	620	3,500	445	2,445
Petroleum.....brls.	165,205	356,000	172,641	359,268	206,379	401,430
Quartz (a).....tons	1,142,372	633,073	1,173,259	597,037	1,333,342	665,148
Salt.....tons	407,701	1,539,599	388,130	1,637,140	370,843	2,200,189
Silica brick.....M	818	59,980	595	50,592	603	49,595
Sulphur†.....tons	14,009	140,090	16,897	168,970	16,126	161,260
Talc.....tons	12,457	123,301	10,853	109,810	13,144	128,595
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	2,650,652	3,657,067	1,818,032	2,555,214	1,709,263	2,437,777
Clay products.....		2,033,845		2,083,496		2,346,638
Lime—						
Quicklime.....tons	268,304	1,874,405	242,629	1,692,227	268,622	1,870,035
Hydrated lime.....tons	26,163	278,239	27,849	297,032	33,637	366,917
Sand and gravel.....tons	8,832,526	3,613,854	8,531,281	3,046,043	9,350,875	3,537,216
Stone.....tons	4,223,000	3,663,768	2,513,291	2,323,165	2,437,594	2,298,111
Total.....		230,042,517		219,801,994		232,519,948

* The total production of blast-furnace pig-iron in Ontario chiefly from foreign ores and scrap in 1938 was 463,571 long tons; in 1937 it was 578,537 long tons, and in 1939 it was 496,595 long tons.

† Sulphur content of pyrites shipped and estimated sulphur salvaged from smelter gases.

(a) Includes low grade silica sand for fluxing purposes since 1936.

DOMINION BUREAU OF STATISTICS

Table 14.—Mineral Production of Manitoba, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....lb.	164,223	269,326	115,166	92,543	73,830	52,029
Copper.....lb.	44,920,835	5,874,747	65,582,772	6,539,914	70,458,890	7,110,711
Gold.....fine oz.	157,949	5,526,636	185,706	6,532,209	180,875	6,537,003
Selenium.....lb.	43,920	75,982	57,788	100,262	†	†
Silver.....fine oz.	905,179	406,253	1,198,315	520,991	1,028,485	416,413
Tellurium.....lb.	5,124	8,865	4,454	7,661	†	†
Zinc.....lb.	36,221,314	1,775,569	46,864,575	1,440,148	40,302,747	1,236,891
Non-METALLICS—						
Coal.....tons	3,172	7,709	2,016	5,660	1,138	3,110
Feldspar.....tons			78	451	40	330
Gypsum.....tons	13,941	88,095	14,571	92,129	15,961	98,578
Lithium minerals.....\$		1,694				
Natural gas.....M cu. ft.	600	180	600	180	600	180
Salt.....tons	3,391	43,465	2,920	34,979	2,453	35,888
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	328,518	745,736	330,889	754,427	343,717	773,363
Clay products.....		95,551		105,334		78,892
Lime—						
Quicklime.....tons	18,252	143,040	15,600	124,763	15,625	119,696
Hydrated lime.....tons	4,345	72,125	4,224	73,922	4,407	76,494
Sand and gravel.....tons	1,380,957	551,464	1,216,084	645,812	1,363,593	514,404
Stone.....tons	41,191	65,228	39,378	101,617	36,143	83,948
Total.....		15,751,645		17,173,002		17,137,930

† No commercial recovery reported.

Table 15.—Mineral Production of Saskatchewan, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....lb.	144,553	237,067	73,630	59,166	66,608	46,939
Copper.....lb.	22,436,843	2,934,290	18,156,157	1,810,532	18,133,149	1,829,997
Gold.....fine oz.	65,886	2,305,351	50,021	1,759,489	77,120	2,787,194
Selenium.....lb.	28,080	48,578	28,612	49,642	†	†
Silver.....fine oz.	821,818	368,840	898,413	390,603	1,141,600	462,211
Tellurium.....lb.	3,276	5,667	2,206	3,794	†	†
Zinc.....lb.	32,750,910	1,605,449	29,962,597	920,751	37,278,001	1,144,062
Coal.....tons	1,049,348	1,494,337	1,022,166	1,380,416	959,595	1,255,142
Quartz (a).....tons	95,809	33,533	116,898	40,914	134,192	46,967
Salt.....tons						
Sodium sulphate.....tons	79,804	617,548	62,920	552,180	71,455	627,965
Natural gas.....M cu. ft.	100,380	35,130	90,285	34,136	96,423	36,640
CLAY PRODUCTS AND OTHER STRUCTURAL						
Clay products.....		115,330		118,713		148,774
Sand and gravel.....tons	822,447	470,343	1,037,753	662,511	1,913,995	408,199
Total.....		10,271,463		7,782,847		8,794,690

(a) Low grade silica sand for fluxing purposes.

† No commercial recovery reported.

Table 16.—Mineral Production of Alberta, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Quantity	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold.....fine oz.	46	1,610	305	10,728	359	12,974
Silver.....fine oz.	4	2	23	10	32	13
NON-METALLICS—						
Bituminous sands.....tons	35	142	(a)	(a)	(a)	(a)
Coal.....tons	5,562,839	14,563,911	5,251,233	13,698,470	5,519,208	14,415,281
Natural gas.....M cu. ft.	20,955,506	4,766,437	21,822,108	4,807,346	22,513,660	4,915,821
Petroleum.....brls.	2,749,085	4,961,002	6,751,312	8,775,094	7,576,932	9,362,363
Salt.....tons			4,045	46,035	3,319	37,526
Sodium sulphate.....tons	80	480	89	1,127	30	186
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	267,106	531,541	304,373	611,790	377,846	744,357
Clay products.....		338,638		377,337		461,079
Lime—						
Quicklime.....tons	10,224	89,209	11,744	103,922	12,113	104,772
Hydrated lime.....tons	427	4,269	309	3,090	386	3,860
Sand and gravel.....tons	711,966	312,687	792,760	525,175	817,168	619,105
Stone.....tons	13,225	27,189	1,691	6,148	3,048	14,280
Total.....		25,597,117		28,966,272		30,691,617

(a) Included with petroleum refining.

Table 17.—Mineral Production of British Columbia, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Antimony.....lb.					1,224,385	151,321
Bismuth.....lb.					409,449	466,362
Cadmium.....lb.	436,431	715,747	510,342	410,090	799,253	563,241
Copper.....lb.	45,797,988	5,989,461	65,759,265	6,557,514	73,253,408	7,392,734
Gold.....fine oz.	505,857	17,699,936	605,617	21,302,578	626,970	22,659,323
Lead.....lb.	403,589,913	20,623,445	413,706,307	13,834,339	378,440,666	11,992,784
Mercury.....lb.			760	760	436	1,226
Nickel.....lb.		37,753				
Palladium.....fine oz.	22	1,066	16	515	25	877
Silver.....fine oz.	11,530,177	5,174,859	11,186,563	4,863,582	10,648,031	4,311,175
Tungsten concentrates.....lb.					8,825	4,917
Zinc.....lb.	287,192,877	14,078,195	299,363,564	9,199,443	279,041,497	8,563,784
NON-METALLICS—						
Coal.....tons	1,598,843	5,863,849	1,440,287	5,237,077	1,537,905	5,464,061
Diatomite.....tons	124	1,346	14	362	17	447
Grindstones, pulpstones.....tons	87	4,875				
Gypsum.....tons	15,764	108,478	17,451	100,080	18,150	100,641
Iron oxides (ochre).....tons	580	6,000	434	4,560	550	5,917
Magnesium sulphate.....tons	727	14,456	470	9,400	550	9,900
Mica.....tons			48	1,562	(a)	(a)
Sodium carbonate.....tons	286	2,574	252	2,268	300	2,400
Sulphur*.....tons	88,370	820,406	78,918	777,586	133,676	1,230,814
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	344,072	623,725	335,488	626,731	272,679	520,420
Clay products.....		349,640		365,132		371,140
Lime—						
Quicklime.....tons	22,799	131,709	14,518	140,347	18,035	165,036
Hydrated lime.....tons	4,940	22,328	5,137	33,814	4,816	32,223
Sand and gravel.....tons	1,648,963	733,935	2,211,682	751,491	2,284,995	870,268
Stone.....tons	463,611	552,015	288,337	329,899	313,138	355,734
Total.....		73,555,798		64,549,130		65,216,745

* Includes sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

(a) Data not available for publication.

Table 18.—Mineral Production of Yukon, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold.....fine oz.	47,982	1,678,890	72,368	2,545,544	87,745	3,171,192
Lead.....lb.	6,440,454	329,107	5,198,990	173,854	7,544,632	239,089
Silver.....fine oz.	3,956,504	1,775,719	2,844,659	1,236,772	3,830,864	1,551,040
NON-METALLICS—						
Coal.....tons	84	812	361	3,400		
Total.....		3,784,528		3,959,570		4,961,321

Table 19.—Mineral Production of Northwest Territories, 1937-1939

Products	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Copper.....lb.			75,567	7,535	42,382	4,277
Gold.....oz.			6,800	239,190	51,914	1,876,224
Radium and uranium products.....	(a)	(a)	(a)	(a)	(a)	1,121,553
Natural gas.....M cu. ft.	1,500	335	1,500	335	1,500	335
Silver.....fine oz.	135,442	60,788	581,902	252,993	483,874	195,911
Petroleum, crude.....brls.	11,371	56,855	22,855	68,565	20,191	50,477
Total.....		117,978		568,618		3,248,777

(a) Data not available for publication.

In 1937 shipments from the mine consisted of 396.3 tons of pitchblende-silver concentrates and 169.8 tons of silver-copper concentrates; the total value of finished products of radium, uranium, and silver amounted to \$850,000 according to the 1937 annual printed report of the Eldorado Gold Mines Ltd.

During 1938 there were 689 tons of pitchblende-silver concentrates valued at \$1,560,824 shipped from the mine to the Port Hope refinery and 104 tons of copper-silver concentrates valued at \$32,649 shipped to Tacoma, Wash. The silver content of all Eldorado shipments is included under silver for the years shown.

NOTE.—For complete data relating to Canadian Mineral Production, by Provinces, see Annual Mineral Production Report for 1938.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1935-1939

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
Metal Mining Industries							
ALLUVIAL GOLD MINES							
1935.....	84	86	9,198,533	702	1,227,971	91,737	2,106,025
1936.....	80	85	10,965,524	853	1,519,659	166,574	2,893,981
1937.....	106	109	11,919,937	1,069	1,689,911	176,560	3,066,636
1938.....	111	113	12,846,973	1,071	2,056,936	288,370	3,753,052
1939.....	98	104	9,844,524	830	1,439,765	318,613	4,204,974
AURIFEROUS QUARTZ MINES							
1935.....	377	384	193,728,802	19,834	31,523,907	16,594,031	75,120,774
1936.....	580	607	256,018,578	25,097	39,826,742	19,882,784	88,210,233
1937.....	631	659	269,145,649	29,140	48,219,318	24,714,827	97,961,278
1938.....	535	550	251,203,802	29,647	50,462,092	28,674,805	114,472,106
1939.....	455	474	248,692,569	30,622	53,206,225	30,380,927	129,633,245
COPPER-GOLD-SILVER MINES							
1935.....	16	18	38,461,682	3,430	5,040,196	3,433,284	13,243,163
1936.....	26	27	40,732,717	3,738	5,473,325	3,652,068	15,619,897
1937.....	35	38	73,338,258	5,164	8,240,614	15,832,950	24,902,851
1938.....	37	39	65,416,729	5,577	8,921,465	20,544,691	28,795,492
1939.....	28	30	58,867,620	6,083	9,920,591	24,978,891	26,182,577
SILVER-COBALT MINES							
1935.....	27	28	6,380,731	402	494,791	246,218	2,070,716
1936.....	24	25	5,946,702	363	458,546	181,592	915,376
1937.....	23	25	2,655,060	300	394,386	312,624	540,762
1938.....	34	30	2,696,217	297	386,851	446,070	288,293
1939.....	36	43	2,461,556	323	412,728	237,096	653,032
SILVER-LEAD-ZINC MINES*							
1935.....	69	70	16,596,941	1,657	2,431,110	1,205,822	10,553,086
1936.....	88	89	19,372,600	1,870	2,917,832	1,894,495	13,814,645
1937.....	128	130	29,637,739	2,220	3,914,643	5,788,385	22,740,582
1938.....	107	108	30,386,714	1,640	3,027,915	5,068,253	18,483,945
1939.....	82	83	23,664,620	1,646	2,803,057	4,699,242	13,555,609
NICKEL-COPPER MINES							
1935.....	4	7	26,685,284	3,552	6,059,407	3,461,632	11,030,621
1936.....	5	9	30,131,192	4,406	7,331,542	4,102,807	18,710,379
1937.....	8	11	33,979,540	5,402	10,193,491	5,185,229	25,812,659
1938.....	8	11	35,363,940	5,342	9,916,179	5,174,337	25,491,028
1939.....	4	7	35,307,319	5,759	10,960,710	6,117,331	32,259,124
MISCELLANEOUS METAL MINES							
1935.....	12	12	733,497	82	63,612	9,300	22,847
1936.....	11	11	770,957	113	142,974	30,345	3,147
1937.....	15	15	1,320,012	121	155,191	33,385	52,655
1938.....	19	19	1,380,035	129	145,551	16,905	7,997
1939.....	31	31	3,074,999	331	455,278	175,573	349,404
NON-FERROUS METAL SMELTING AND REFINING							
1935.....	12	14	145,686,299	8,944	12,687,356	(b)126,804,075	+ 59,441,583
1936.....	11	14	143,858,717	10,015	14,346,050	(b)158,460,775	+ 71,276,645
1937.....	10	13	162,696,595	11,570	17,990,947	(b)216,470,386	+101,807,865
1938.....	10	13	184,337,126	12,788	19,549,963	(b)200,204,359	+ 87,091,374
1939.....	9	13	192,186,465	12,449	19,372,119	(b)182,544,662	+ 80,057,833
Total Metal Mining Industries							
1935.....	601	619	437,471,769	38,603	59,528,350	151,846,099	173,588,815
1936.....	825	867	507,796,987	46,455	72,016,670	188,371,440	211,441,303
1937.....	956	1,000	584,692,790	55,046	90,798,501	268,514,346	276,885,288
1938.....	861	883	583,631,536	56,491	91,466,932	260,417,691	278,367,293
1939.....	743	785	574,099,672	58,043	98,570,473	249,452,335	286,895,798

*Contains data relating to silver-pitchblende ores in the Northwest Territories. †Value added by smelting.

(b) Includes fuel and electricity used for metallurgical purposes and cost of ores treated which were \$108,081,399 in 1935 \$137,857,432 in 1936 and \$191,303,251 in 1937, \$173,070,377 in 1938 and \$154,879,498 in 1939.

(c) See footnote at end of this table.

(d) See end of table.

DOMINION BUREAU OF STATISTICS

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries,
1935-1939—Continued

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
Total Non-Metal Mining Industries, including Fuels							
*FUELS							
COAL							
1935.....	516	556	110,516,517	26,198	26,595,344	12,851,633	26,894,671
1936.....	516	553	109,703,043	26,918	28,873,135	8,088,154	34,852,621
1937.....	480	503	118,273,848	27,202	31,641,679	8,717,711	37,261,013
1938.....	462	498	111,495,137	27,074	28,699,781	7,926,328	34,207,513
1939.....	467	510	109,072,484	26,472	30,720,991	8,203,815	38,062,870
NATURAL GAS							
1935.....	199	3,190	69,221,051	1,719	1,932,937	215,918	6,580,061
1936.....	227	3,253	77,666,568	2,075	2,456,918	79,034	9,062,657
1937.....	218	3,268	75,611,107	2,028	2,488,125	98,880	8,938,446
1938.....	218	3,325	79,143,830	1,966	2,506,121	82,887	9,748,677
1939.....	222	3,352	78,409,338	1,990	2,536,220	98,397	10,634,146
PETROLEUM							
1935.....	244	2,285	33,398,894	940	1,046,046	808,500	3,217,927
1936.....	256	2,266	33,289,876	1,052	1,298,592	510,016	3,439,317
1937.....	280	2,328	42,147,521	1,620	2,340,359	1,109,966	4,892,672
1938.....	310	2,400	51,685,038	1,894	2,656,112	1,141,762	8,986,071
1939.....	348	2,389	52,102,077	1,780	2,567,983	1,432,055	9,310,922
TOTALS FUELS							
1935.....	959	6,031	213,136,462	28,857	29,574,327	13,876,051	36,692,659
1936.....	999	6,072	220,659,487	30,045	32,623,645	8,677,204	47,354,695
1937.....	978	6,099	236,032,476	30,850	36,470,163	9,926,567	51,092,131
1938.....	990	6,223	242,324,005	30,934	33,862,014	9,150,977	52,942,861
1939.....	1,037	6,261	239,583,899	30,242	35,825,194	9,734,267	58,007,938
OTHER NON-METAL MINING INDUSTRIES							
ABRASIVES—NATURAL							
1935.....	9	9	114,114	42	25,135	6,326	60,824
1936.....	8	8	77,279	30	17,442	3,528	34,846
1937.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1938.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1939.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
ASBESTOS							
1935.....	8	9	16,805,583	2,072	1,904,053	2,058,451	4,996,163
1936.....	10	11	18,877,326	2,647	2,642,924	2,399,475	7,558,708
1937.....	10	11	21,249,676	3,842	4,232,507	4,076,235	10,429,556
1938.....	8	9	22,008,771	3,711	4,024,363	3,187,725	9,702,470
1939.....	8	9	22,489,233	3,784	4,347,064	3,463,513	12,395,699

*Production of peat since 1929 included in the miscellaneous non-metallics.

(c) See footnote at end of this table.

(a) Included with miscellaneous.

(d) See footnote at end of table.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1935-1939—Continued

1 Year	2 Number of active firms	3 Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	4 Capital employed (excluding ore reserves or other unmined material) \$	5 Number of employees	6 Salaries and wages \$	7 Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	8 Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
OTHER NON-METAL MINING INDUSTRIES—Continued							
FELDSPAR, QUARTZ, AND NEPHELINE SYENITE							
1935.....	28	28	1,151,986	260	182,792	58,012	511,200
1936.....	34	34	1,400,024	324	238,848	160,913	628,769
1937.....	39	39	1,352,992	445	384,698	186,470	1,242,244
1938.....	32	32	1,605,136	375	342,248	168,509	1,065,138
1939.....	43	43	1,591,015	338	330,170	178,721	1,173,950
GYPSUM							
1935.....	6	13	5,737,114	467	367,007	187,027	745,176
1936.....	9	14	8,954,654	514	440,297	218,869	1,060,102
1937.....	8	13	6,902,222	602	595,396	263,077	1,277,406
1938.....	9	15	7,325,412	623	528,027	239,306	1,262,959
1939.....	10	17	6,806,907	714	692,158	299,319	1,635,808
IRON OXIDES (OCHRE)							
1935.....	5	5	175,935	32	26,748	12,264	64,836
1936.....	6	6	167,499	39	30,281	11,419	58,211
1937.....	6	6	213,248	50	35,368	13,878	69,762
1938.....	6	6	200,057	37	31,557	8,124	63,645
1939.....	7	7	215,445	38	26,916	8,194	80,224
MICA							
1935.....	24	24	145,557	92	45,217	695	81,343
1936.....	22	22	221,800	101	44,550	4,824	69,732
1937.....	34	34	150,569	199	97,547	17,546	116,185
1938.....	40	40	159,758	156	74,424	19,247	61,742
1939.....	61	61	230,337	224	112,653	19,014	128,307
SALT							
1935.....	10	10	3,776,333	473	597,785	213,940	1,667,038
1936.....	9	9	3,856,187	506	640,644	212,697	1,560,447
1937.....	9	9	4,001,568	543	653,136	259,064	1,540,401
1938.....	9	9	4,270,799	562	786,720	309,080	1,603,833
1939.....	9	9	4,447,204	547	741,736	784,778	2,173,204
TALC AND SOAPSTONE							
1935.....	8	8	639,501	94	69,803	37,411	134,121
1936.....	7	7	647,929	85	70,935	33,392	143,878
1937.....	7	7	625,497	83	72,020	25,394	138,420
1938.....	6	6	212,491	75	59,426	23,907	120,941
1939.....	6	6	239,835	65	60,512	22,332	147,734
MISCELLANEOUS							
1935.....	44	44	2,555,124	366	357,837	254,948	785,784
1936.....	41	41	2,195,621	477	526,248	548,434	1,006,194
1937†.....	53	53	3,050,376	530	658,723	550,872	1,136,445
1938.....	50	50	2,787,671	394	475,567	409,229	779,093
1939.....	46	47	3,128,035	465	539,143	394,357	964,565

(c) See footnote at end of this table.

(d) See footnote at end of this table.

† Includes natural abrasives data for first time.

‡ Value of containers is included here for the first time.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1935-1939—Continued

1 Year	2 Number of active firms	3 Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	4 Capital employed (excluding ore reserves or other unmined material) \$	5 Number of employees	6 Salaries and wages \$	7 Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	8 Net value of bullion; ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
<i>TOTAL OTHER NON-METAL MINING INDUSTRIES—Concluded</i>							
1935.....	142	150	31,101,247	3,898	3,576,377	2,829,074	9,046,485
1936.....	146	152	36,398,319	4,723	4,652,169	3,693,551	12,120,887
1937.....	166	172	37,546,148	6,294	6,729,395	6,392,536	15,950,419
1938.....	160	167	38,670,095	5,933	6,322,332	4,365,127	14,659,821
1939.....	190	199	39,148,011	6,175	6,850,352	5,170,228	18,699,491
<i>Total Non-Metal Mining Industries, including Fuels</i>							
1935.....	1,101	6,181	244,237,709	32,755	33,150,704	16,705,125	45,739,144
1936.....	1,145	6,224	257,057,806	31,768	37,280,814	12,270,755	59,475,482
1937.....	1,144	6,271	273,578,624	37,144	43,199,558	15,319,093	67,042,550
1938.....	1,150	6,390	280,894,100	36,867	40,184,346	13,516,104	67,602,082
1939.....	1,227	6,450	278,731,910	36,417	42,675,546	14,904,495	76,707,429
<i>Clay Products and Other Structural Materials</i>							
CLAY PRODUCTS							
Brick, Tile and Sewer Pipe							
1935.....	129	136	20,144,431	1,609	1,293,159	666,163	2,127,241
1936.....	129	136	19,487,227	1,651	1,397,395	747,183	2,506,008
1937.....	131	137	20,087,448	2,159	2,002,075	1,121,754	3,163,758
1938.....	140	147	17,756,732	2,125	2,009,836	1,039,148	3,284,486
1939.....	133	141	17,614,307	2,055	2,072,351	1,093,160	3,852,837
STONEWARE AND POTTERY							
1935.....	3	3	357,575	119	94,765	13,415	205,744
1936.....	4	4	376,204	124	100,753	19,171	198,665
1937.....	6	6	339,784	128	92,717	14,569	216,778
1938.....	5	5	311,810	117	100,397	14,701	197,749
1939.....	8	8	326,435	110	89,337	14,338	190,901
<i>TOTAL CLAY PRODUCTS *</i>							
1935.....	132	139	20,502,006	1,728	1,387,924	679,578	2,332,983
1936.....	133	140	19,863,431	1,775	1,498,148	766,354	2,704,674
1937.....	137	143	20,427,232	2,287	2,094,792	1,136,323	3,380,536
1938.....	145	152	18,068,542	2,242	2,110,233	1,053,849	3,482,235
1939.....	141	149	17,940,742	2,165	2,161,688	1,107,498	4,043,738
<i>OTHER STRUCTURAL MATERIALS †</i>							
CEMENT							
1935.....	4	9	52,454,004	924	1,027,416	1,621,674	3,958,369
1936.....	4	9	53,343,991	1,052	1,196,664	2,169,071	4,739,121
1937.....	4	9	54,150,672	1,083	1,373,444	2,445,333	6,650,534
1938.....	3	8	52,299,046	1,034	1,306,331	2,293,584	5,947,766
1939.....	3	8	51,251,358	1,001	1,297,542	2,238,039	6,273,172

(c) See footnote at end of this table.

(d) See footnote at end of this table.

* Includes kaolin and other clays.

† A considerable proportion of the values shown for lime and stone sales represents shipments for chemical purposes—see Chapter 9.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1935-1939—Concluded

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material) \$	Number of employees	Salaries and wages \$	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$

OTHER STRUCTURAL MATERIALS—Concluded

LIME

1935.....	49	54	5,707,391	756	556,049	810,437	2,115,354
1936.....	52	57	6,106,901	799	640,322	839,979	2,495,991
1937.....	52	57	4,931,831	872	781,274	1,038,958	2,785,959
1938.....	48	53	4,881,214	867	795,068	939,989	2,602,663
1939.....	54	59	4,802,983	937	849,468	1,052,012	2,951,502

SAND AND GRAVEL

1935.....	1,398	5,400	4,849,702	3,015	2,479,418	116,063	6,273,377
1936.....	1,356	5,374	2,994,127	3,638	2,090,388	101,059	6,820,340
1937.....	1,560	7,373	6,706,288	6,084	3,468,471	295,348	10,197,348
1938.....	1,339	6,094	3,286,340	6,959	4,482,916	254,595	11,747,959
1939.....	1,403	6,215	2,735,690	6,120	3,981,913	274,509	10,966,593

STONE

1935.....	372	496	12,277,518	2,475	1,950,698	734,339	4,573,224
1936.....	426	558	11,899,852	2,512	2,043,216	841,704	4,292,449
1937.....	418	555	12,857,537	2,898	2,576,344	1,085,548	5,853,812
1938.....	429	550	11,187,274	2,815	2,298,154	890,350	4,665,676
1939.....	452	573	12,213,030	3,076	2,816,578	1,081,884	5,393,812

TOTAL OTHER STRUCTURAL MATERIALS

1935.....	1,823	5,959	75,288,615	7,170	6,013,581	3,282,513	16,920,324
1936.....	1,838	5,998	74,344,871	8,001	5,970,590	3,951,813	18,347,901
1937.....	2,034	7,994	78,646,328	10,937	8,199,533	4,865,187	25,487,653
1938.....	1,819	6,705	71,653,874	11,675	8,882,469	4,378,518	24,964,064
1939.....	1,912	6,855	71,003,061	11,134	8,945,501	4,646,444	25,585,079

Total Clay Products and Other Structural Materials

1935.....	1,955	6,098	95,790,621	8,898	7,401,505	3,962,091	19,253,309
1936.....	1,971	6,138	94,208,302	9,776	7,468,738	4,718,167	21,052,574
1937.....	2,171	8,137	99,073,560	13,224	10,294,325	6,001,510	28,868,189
1938.....	1,964	6,857	89,722,416	13,917	10,992,702	5,432,367	28,446,299
1939.....	2,053	7,004	88,943,803	13,299	11,107,189	5,753,942	29,628,817

GRAND TOTAL OF ALL INDUSTRIES

1935.....	3,657	12,898	777,500,099	80,256	100,080,559	172,513,315	238,581,268
1936.....	3,941	13,229	859,063,095	90,999	116,766,222	205,360,362	291,972,359
1937.....	4,271	15,408	957,344,974	105,414	144,292,384	289,834,949	372,796,027
1938.....	3,975	14,130	954,248,052	107,275	145,644,000	279,366,162	374,415,674
1939.....	4,023	14,239	941,775,385	107,759	152,353,208	270,110,772	393,232,044

(c) The value of fuel, purchased electricity and process supplies used was deducted from the gross value of shipments for the first time in 1935; this was done in order to attain a more accurate approximation of a net value. Also the cost of ores, etc., treated in non-ferrous metallurgical plants is deducted in determining the figure "value added"; these costs were as follows: 1935, \$108,081,299; 1936, \$137,857,432; 1937, \$191,303,251; 1938, \$173,070,377; 1939, \$154,879,498. (d) The cost of freight and treatment charges was deducted by the shipper of metal bearing ores for all years prior to 1937; in 1937, 1938 and 1939 the cost of freight and treatment charges was reported separately and deducted at the Bureau of Statistics.

NOTE.—The net value as given in column 8 represents the **gross value** as given by the operator less the cost of items indicated in column 7.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1935-1939

1	2	3	4	5	6	7
Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material) \$	Number of employees	Salaries and wages \$	Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d) \$	Net value of bullion, ore, concentrates residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*) \$
(c) NOVA SCOTIA						
1935.....	267	53,569,182	14,550	14,301,510	7,758,899	14,207,064
1936.....	365	55,513,999	15,368	15,980,687	5,645,436	19,136,304
1937.....	1,210	59,114,458	15,629	18,373,958	6,076,253	22,597,547
1938.....	810	52,594,162	15,591	15,959,095	5,258,556	20,224,347
1939.....	914	52,580,559	15,202	17,371,518	5,450,671	23,504,419
NEW BRUNSWICK						
1935.....	520	4,522,963	2,390	1,865,407	331,315	2,467,339
1936.....	423	5,253,829	1,744	1,248,431	242,114	2,324,747
1937.....	423	4,676,203	3,012	1,509,063	293,867	2,442,101
1938.....	409	4,310,273	3,042	2,074,273	273,978	3,506,250
1939.....	426	4,466,757	3,263	2,311,835	329,538	3,600,454
QUEBEC						
1935.....	3,850	117,534,858	11,811	12,794,600	39,781,783	33,679,150
1936.....	4,011	140,537,708	14,225	15,774,362	48,436,955	44,823,567
1937.....	5,120	181,868,872	19,121	22,708,131	67,723,503	60,872,828
1938.....	4,161	179,013,810	20,829	24,485,254	79,226,191	69,593,807
1939.....	4,137	179,371,057	20,872	25,689,382	81,840,188	81,600,118
ONTARIO						
1935.....	6,274	322,300,162	25,264	38,152,140	81,172,486	130,220,051
1936.....	6,297	384,535,666	31,105	46,899,805	108,353,709	151,874,462
1937.....	6,343	389,129,937	36,238	58,891,339	145,830,800	190,447,576
1938.....	6,342	389,031,046	35,791	58,926,900	136,143,954	181,897,886
1939.....	6,380	397,025,573	37,233	63,220,042	119,307,190	188,867,969
MANITOBA						
1935.....	119	40,944,700	2,346	3,403,649	9,720,167	9,040,591
1936.....	274	41,722,791	2,932	3,752,367	7,307,942	9,366,496
1937.....	275	55,815,784	3,159	4,301,366	14,293,086	13,415,841
1938.....	276	44,564,907	2,840	4,393,270	14,478,826	15,144,672
1939.....	260	36,516,216	3,027	4,541,992	16,217,955	12,401,404
SASKATCHEWAN						
1935.....	223	11,390,801	1,457	1,343,041	*2,336,670	2,869,351
1936.....	219	14,974,371	1,828	1,937,825	3,826,763	5,720,747
1937.....	248	22,037,133	2,307	2,372,443	7,376,254	8,226,326
1938.....	269	18,695,606	2,287	2,470,530	5,345,294	7,029,842
1939.....	258	18,833,439	2,026	2,347,264	6,749,197	6,391,404

Plants in the provinces do not add to Canada total, owing to the fact that a plant located on the Manitoba-Saskatchewan boundary is counted but once.

*See footnote, preceding table.

(b) Includes fuel and electricity used for metallurgical purposes.

(c) Statistics for Prince Edward Island included with Nova Scotia in 1936.

(d) See footnote, previous table.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1935-1939—Concluded

1	2	3	4	5	6	7
Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d)	Net value of bullion, ore, concentrates and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*)
		\$		\$	\$	\$
ALBERTA						
1935.....	585	102,656,116	9,706	10,862,198	4,876,482	16,738,472
1936.....	594	104,118,831	10,376	11,850,463	2,357,005	20,104,417
1937.....	637	110,055,642	10,843	12,924,934	2,819,959	20,988,638
1938.....	678	120,140,472	10,612	12,811,975	2,967,269	24,931,056
1939.....	709	121,311,648	10,548	13,097,818	3,508,845	26,049,861
BRITISH COLUMBIA						
1935.....	1,048	118,291,187	12,352	16,479,606	26,270,909	28,172,657
1936.....	1,029	103,483,250	12,827	17,908,553	28,553,612	36,694,755
1937.....	1,135	121,739,009	14,282	21,487,277	44,123,775	51,176,437
1938.....	1,158	129,667,163	15,179	21,975,143	53,686,771	49,519,855
1939.....	1,130	119,437,585	14,587	21,698,690	34,754,310	45,419,651
NORTHWEST TERRITORIES						
1935.....	6	531,292	47	69,341	19,629	(a) 105,176
1936.....	4	274,883	28	40,812	12,140	(a) 14,415
1937.....	8	2,114,300	132	221,181	113,221	(a)—(e)
1938.....	17	4,186,077	310	584,619	407,710	(a)—(e)
1939.....	15	2,110,344	273	468,996	354,228	1,592,779
YUKON						
1935.....	7	5,758,838	333	809,067	244,975	1,081,417
1936.....	14	8,647,767	566	1,372,917	624,686	1,912,449
1937.....	10	10,793,636	691	1,502,692	1,184,231	2,685,664
1938.....	11	12,044,536	794	1,962,941	1,577,613	2,667,051
1939.....	10	10,117,207	728	1,605,671	1,598,650	3,803,985
Canada						
1935.....	12,898	777,500,099	80,256	100,080,559	172,513,315	238,581,268
1936.....	13,229	859,063,095	90,999	116,766,222	205,366,362	291,972,359
1937.....	15,408	957,344,974	105,414	144,292,384	289,834,949	372,796,027
1938.....	14,130	954,248,052	107,275	145,644,000	279,366,162	374,415,674
1939.....	14,239	941,775,385	107,759	152,353,208	270,110,772	393,232,044

Plants in the provinces do not add to Canada total, owing to the fact that a plant located on the Manitoba-Saskatchewan boundary is counted but once.

*See footnote, preceding table.

(a) Value radium and uranium not included.

(b) Includes fuel and electricity used for metallurgical purposes.

(d) See footnote, previous table.

(e) Northwest Territories showed a loss \$56,931 in 1937 and \$99,092 in 1938 owing to the fact that radium and uranium products are not included. These amounts should be subtracted from the total net value by provinces to give the total net value for Canada.

Table 22.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1939

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage earners	Total†	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
Nova Scotia.....	548	69	14,585	15,202	1,130,376	16,241,142	17,371,518
New Brunswick.....	69	19	3,175	3,263	167,652	2,144,133	2,311,835
Quebec.....	1,641	132	19,099	20,872	3,418,780	22,270,602	25,689,382
Ontario.....	2,645	378	34,210	37,233	7,183,984	56,036,058	63,220,042
Manitoba.....	293	18	2,716	3,027	646,762	3,895,230	4,541,992
Saskatchewan.....	174	14	1,838	2,026	337,945	2,009,319	2,347,264
Alberta.....	861	117	9,570	10,548	1,906,811	11,191,007	13,097,818
British Columbia.....	1,327	141	13,119	14,587	3,216,554	18,482,136	21,698,690
Yukon.....	46	7	675	728	156,323	1,449,348	1,605,671
Northwest Territories.....	38	.....	238	273	67,570	401,426	468,996
Canada.....	7,639	895	99,225	107,759	18,232,757	134,120,451	152,353,208

* The average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous years, is the sum of these individual averages.

† The data are not inclusive of all individuals or syndicates engaged exclusively in prospecting or general exploration.

Table 23.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1939

Industry	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
METAL MINING							
Alluvial Gold Mines.....	57	10	763	830	160,433	1,279,332	1,439,765
Auriferous Quartz Mines.....	2,514	149	27,959	30,622	6,369,380	46,836,845	53,206,225
Copper-Gold-Silver Mines.....	461	35	5,587	6,083	1,165,232	8,755,359	9,920,591
Silver-Cobalt Mines.....	41	4	278	323	75,730	336,998	412,728
Silver-Lead-Zinc Mines†.....	242	29	1,375	1,646	466,721	2,336,336	2,803,057
Nickel-Copper Mines.....	72	2	5,685	5,759	263,920	10,696,790	10,960,710
Miscellaneous Metal Mines.....	38	2	291	331	62,477	392,801	455,278
Non-ferrous Smelting and Refining.....	923	166	11,360	12,449	2,670,414	16,701,705	19,372,119
NON-METAL MINING, INCLUDING FUELS							
Coal.....	1,165	107	25,200	26,472	2,536,472	28,184,519	30,720,991
Natural Gas.....	610	179	1,201	1,990	1,202,284	1,333,936	2,536,220
Petroleum.....	239	44	1,497	1,780	532,040	2,035,943	2,567,983
Other Non-Metallic Mining							
Asbestos.....	258	41	3,485	3,784	608,529	3,738,535	4,347,064
Feldspar and Quartz (a).....	31	4	303	338	50,910	279,260	330,170
Gypsum.....	62	4	648	714	112,915	579,243	692,158
Iron Oxides.....	5	1	32	38	7,936	18,980	26,916
Mica.....	11	.....	213	224	9,034	103,619	112,653
Salt.....	78	35	434	547	285,023	456,713	741,736
Talc and Soapstone.....	5	1	59	65	18,130	42,382	60,512
Miscellaneous.....	56	12	397	465	140,202	398,941	539,143
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	87	4	910	1,001	198,141	1,099,401	1,297,542
Clay Products.....	234	27	1,904	2,165	526,960	1,634,728	2,161,688
Lime.....	75	10	852	937	128,067	721,401	849,468
Sand and Gravel.....	96	5	6,019	6,120	169,394	3,812,519	3,981,913
Stone.....	279	24	2,773	3,076	472,413	2,344,165	2,816,578
Total.....	7,639	895	99,225	107,759	18,232,757	134,120,451	152,353,208

* See footnote, preceding table.

† Includes pitchblende-silver mines.

(a) Includes nepheline-syenite mines.

Table 24.—The Number of Wage-earners in the Canadian Mining Industry, 1939, who Worked the Number of Hours Specified, during One Week in Month of Normal Employment. (Does not include overtime)

	30 hours or less	31-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-54 hours	55 hours	56-64 hours	65 hours and over	Grand total	Total wages paid in that week*
												\$
By Provinces—												
Nova Scotia.....	33	193	79	568	6,620	64	231	66	382	58	8,294	196,988
New Brunswick.....	6	35	40	11	4,410	54	270	.....	51	41	4,918	63,152
Quebec.....	377	524	1,192	332	16,598	413	1,804	378	2,380	345	24,343	582,629
Ontario.....	320	583	607	1,225	25,361	499	1,755	679	5,652	931	37,612	1,211,183
Manitoba.....	31	62	94	11	2,939	101	149	10	302	35	3,734	83,357
Saskatchewan.....	23	82	53	7	2,381	14	229	190	357	53	3,389	65,419
Alberta.....	378	1,385	342	77	8,860	148	181	10	270	21	11,672	357,324
British Columbia.....	58	332	265	3,241	7,620	77	531	145	1,832	29	14,130	409,522
Yukon.....	.....	.....	.....	.....	.....	.....	.....	.....	412	556	968	37,377
Northwest Territories.....	1	6	.....	.....	34	.....	7	2	215	.....	265	8,109
Canada.....	1,227	3,202	2,672	5,472	74,823	1,370	5,157	1,480	11,853	2,069	109,325	2,995,060
By Industries—												
METAL MINING												
Alluvial Gold Mines.....	3	2	11	.....	152	4	18	14	545	561	1,310	36,203
Auriferous Quartz Mines.....	255	440	52	320	19,035	347	2,711	324	5,590	447	29,521	977,300
Copper-Gold-Silver Mines.....	36	87	.....	9	4,375	6	394	15	782	27	5,731	175,390
Silver-Cobalt Mines.....	1	1	.....	1	315	1	79	.....	19	11	428	9,593
Silver-Lead-Zinc Mines.....	.....	1	.....	.....	1,046	1	.....	.....	269	12	1,329	45,914
Nickel-Copper Mines.....	.....	.....	.....	285	5,819	.....	2	.....	216	5	6,327	220,116
Miscellaneous Metal Mines.....	2	.....	11	.....	21	.....	35	.....	307	.....	376	8,162
Non-Ferrous Smelting and Re-fining.....	.....	.....	853	3,775	6,607	4	243	.....	380	4	11,866	331,260
NON-METAL MINING, INCLUDING FUELS												
Coal.....	336	1,113	259	594	17,272	159	185	202	465	7	20,592	575,932
Natural gas.....	123	276	255	5	279	56	199	15	200	46	1,454	35,458
Petroleum.....	64	492	20	19	902	4	23	7	154	16	1,701	47,008
Other Non-Metal Mining—												
Asbestos.....	1	7	11	4	3,727	2	.....	.....	83	34	3,869	78,980
Feldspar and Quartz.....	2	47	13	10	112	11	64	5	120	7	391	7,639
Gypsum.....	31	38	51	11	398	14	51	56	176	50	876	17,027
Iron Oxides.....	5	.....	.....	.....	50	3	.....	.....	.....	.....	58	605
Mica.....	2	2	10	.....	129	40	3	23	10	.....	219	2,188
Salt.....	9	18	97	7	117	12	10	12	136	31	449	9,745
Talc and Soapstone.....	2	2	4	11	.....	12	1	1	35	2	70	944
Miscellaneous.....	30	13	41	5	111	3	41	5	155	146	550	12,593
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS												
Cement.....	.....	127	285	49	391	6	15	.....	169	42	1,084	28,764
Clay Products.....	48	202	183	104	426	322	431	81	936	150	2,883	55,389
Lime.....	12	15	52	33	233	26	167	97	265	80	980	18,030
Sand and Gravel.....	40	63	120	17	12,239	15	83	274	188	51	13,090	222,772
Stone.....	225	256	344	213	1,067	322	402	349	653	340	4,171	78,048
Total.....	1,227	3,202	2,672	5,472	74,823	1,370	5,157	1,480	11,853	2,069	109,325	2,995,060

† Contains data on mining of silver-pitchblende ores in the Northwest Territories.

* Includes the actual money wages paid, the value of room and board, where provided, deductions from employees for social services, such as sickness, accident, insurance, pensions, etc., as well as any other allowance forming part of the employees' wages.

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Table 25.—Employees and Salaries and Wages Paid in Canadian Mining Industry, 1930-1939

Year	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	15,484	19,284,197	1,391	1,132,306	15,397	15,190,714	24,706	34,433,915	3,021	4,372,044	1,371	1,040,790
1931.....	14,871	15,302,444	1,197	1,048,860	11,141	12,666,586	20,277	30,470,475	2,059	3,096,332	1,092	896,131
1932.....	13,706	11,302,801	1,480	1,123,080	7,694	8,198,379	16,376	24,412,126	1,730	2,106,017	924	748,782
1933.....	13,915	9,852,765	1,629	1,402,114	8,629	8,621,984	17,306	25,600,168	1,379	1,847,251	1,265	1,111,001
1934.....	13,500	13,594,114	1,722	1,276,770	10,362	10,492,169	22,033	32,619,846	1,948	2,796,454	1,461	1,257,282
1935.....	14,550	14,301,510	2,390	1,865,407	11,811	12,794,600	25,264	38,152,140	2,346	3,403,649	1,457	1,343,041
1936.....	15,368	15,980,687	1,744	1,248,431	14,225	15,774,362	31,105	46,899,805	2,932	3,752,367	1,828	1,937,825
1937.....	15,629	18,373,958	3,012	1,509,063	19,121	22,708,131	36,238	58,891,339	3,159	4,301,366	2,307	2,372,443
1938.....	15,591	15,959,095	3,042	2,074,273	20,829	24,485,254	35,791	58,926,900	2,840	4,393,270	2,287	2,470,530
1939.....	15,202	17,371,518	3,263	2,311,835	20,872	25,689,382	37,233	63,220,042	3,027	4,541,992	2,026	2,347,264

Year	Alberta		British Columbia		Yukon		Northwest Territories		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	12,675	16,272,916	14,836	21,412,925	319	835,525	.....	.....	89,200	113,975,332
1931.....	10,579	11,357,722	11,297	16,345,887	296	784,862	.....	.....	72,809	91,969,299
1932.....	9,692	10,476,449	9,565	12,612,151	286	761,585	17	30,679	61,470	71,772,049
1933.....	9,057	9,463,382	9,845	11,455,946	233	545,692	76	131,502	63,334	70,031,805
1934.....	9,843	9,792,297	12,270	15,482,102	286	660,814	80	154,338	73,505	88,126,186
1935.....	9,706	10,862,198	12,352	16,479,606	333	809,067	47	69,341	80,256	100,080,559
1936.....	10,376	11,850,463	12,827	17,908,553	566	1,372,917	28	40,812	90,999	116,766,222
1937.....	10,843	12,924,934	14,282	21,487,277	691	1,502,692	132	221,181	105,414	144,292,384
1938.....	10,612	12,811,975	15,179	21,975,143	794	1,962,941	310	584,619	107,275	145,644,000
1939.....	10,548	13,097,818	14,587	21,698,690	728	1,605,671	273	468,996	107,759	152,353,208

Table 26.—Wage-earners, Surface, Underground and Mill, 1939

Province	Metal Mines			Fuels			Other†		
	Surface (a)	Under- ground	Mill	Surface	Under- ground	Mill	Surface	Under- ground	Mill
Nova Scotia.....	143	279	48	2,081	10,954		763	11	306
New Brunswick.....	1			343	1,000		1,608	28	195
Quebec.....	4,442	4,267	615				6,026	586	3,163
Ontario.....	11,655	16,851	1,681	1,040			1,615	172	1,196
Manitoba.....	931	940	190	1	3		444	20	187
Saskatchewan.....	455	203	60	219	456		363	2	80
Alberta.....				3,473	5,492		288	9	308
British Columbia.....	4,874	3,775	985	870	1,956		299	29	331
Yukon.....	393	126	156						
Northwest Territories..	124	89	15	10					
Total 1939.....	23,018	26,530	3,750	8,037	19,861		11,406	857	5,766
Total 1938.....	23,326	24,754	3,713	8,277	20,260		15,808	678	1,894
Total 1937.....	23,608	23,400	3,350	8,204	20,330		11,766	688	5,582
Total 1936.....	20,431	19,223	2,700	7,676	20,086		8,618	155	4,506
Total 1935.....	16,854	16,049	2,454	7,217	19,463		7,355		4,368

† Includes asbestos, salt, gypsum, stone quarries, brick plants, etc., etc.

(a) Including non-ferrous smelters and refineries.

Table 27.—Fuel and Electricity Used for All Purposes

Industry	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
METAL MINING								
Alluvial Gold.....Quantity	23	3				6	66,481	970
\$	1,482	203				600	33,121	483
Auriferous Quartz.....Quantity	26,894	28,573	1,010	981	65	104	524,308	23,849
\$	254,187	275,465	12,684	18,309	365	1,574	164,967	5,421
Copper-Gold-Silver.....Quantity	10,428		197	7	90,749	68	93,344	3,918
\$	91,928		4,121	245	147,085	1,152	27,238	1,216
Silver-Cobalt.....Quantity	356	508	97	217			7,426	26
\$	8,488	4,709	1,568	3,241			2,352	6
Silver-Lead-Zinc.....Quantity	41,666	8			40		74,341	18,356
\$	130,942	283			247	30	34,157	2,776
Nickel-Copper.....Quantity	10,970	10,139	62	119		41	17,714	4,108
\$	6,041	64,776	795	1,897		454	3,867	789
Miscellaneous Metals.....Quantity		37				7,096	4,696	311
\$		296				29,695	1,377	81
Non-Ferrous Smelting and Refining.....Quantity	584,423	152,728	4	59		288,205	89,355	9,360
\$	3,494,642	896,377	55	948		2,699,947	17,481	1,851
Total.....Quantity	664,760	191,996	1,376	1,383	90,854	295,521	877,668	60,898
\$	3,987,710	1,242,109	19,223	24,640	147,687	2,733,452	284,560	12,623
NON-METAL MINING, INCLUDING FUELS								
Coal.....Quantity	557,009				49,015		115,656	2,754
\$	1,656,360				47,900		27,335	623
Natural Gas.....Quantity	13	211					30,695	20
\$	154	1,734					8,534	4
Petroleum.....Quantity	2,281	400			116		75,542	
\$	11,418	2,220			529		17,157	
Total.....Quantity	559,303	611			49,151		221,893	2,774
\$	1,667,932	3,954			48,429		53,026	627
Other Non-Metal Mining								
Asbestos.....Quantity	30,058	54	19,211	6,154		4	96,467	7,586
\$	217,931	822	148,880	44,563		54	19,953	1,358
Feldspar, nepheline syenite and Quartz.....Quantity	892	4,136	7	5			37,692	3,546
\$	6,334	25,006	90	106			7,674	593
Gypsum.....Quantity	8,134	1,134			980	342	154,035	801
\$	48,094	7,203			3,893	3,460	34,357	154
Iron Oxides.....Quantity	23			12		6	1,287	30
\$	154			150		75	358	6
Mica.....Quantity	321						14,130	30
\$	3,274						2,943	8
Salt.....Quantity	17,827	33,725		4,712	5,180		5,575	88
\$	78,506	137,305		21,617	17,754		933	22
Talc and Soapstone.....Quantity	2						8,515	40
\$	18						1,893	7
Miscellaneous.....Quantity	4,998	1,928	4	7,666	13,596		61,890	883
\$	21,327	9,189	56	51,759	34,321		13,276	166
Total.....Quantity	62,255	40,977	19,222	18,549	19,756	352	579,591	13,004
\$	375,638	179,525	148,976	118,194	55,968	3,598	81,587	2,314
STRUCTURAL MATERIALS AND CLAY PRODUCTS								
Cement.....Quantity	190,538	16,141					108,306	2,990
\$	1,010,071	82,336					21,422	523
Clay Products.....Quantity	22,023	77,161	692	381	1,483	540	69,854	6,687
\$	142,851	537,821	4,675	2,367	2,907	4,639	14,825	1,557
Lime.....Quantity	48,628	51,137	249		81	13,570	53,433	101
\$	305,348	235,652	1,956		302	93,136	11,932	24
Sand and Gravel.....Quantity	1,190	2,690	5			3	380,767	1,951
\$	8,487	18,964	67			37	92,039	388
Stone.....Quantity	2,718	6,249	634	5	191	150	364,904	7,474
\$	20,751	43,661	5,258	62	1,337	1,401	81,682	1,107
Total.....Quantity	265,097	153,378	1,580	386	1,755	14,263	977,264	19,203
\$	1,487,508	918,434	11,956	2,429	4,546	99,213	221,950	3,599
Grand Total.....Quantity	1,551,415	386,962	22,178	20,318	161,496	310,136	2,456,416	95,879
\$	7,518,788	2,344,022	180,155	145,263	256,630	2,836,263	640,923	19,163

(a) On outgoing shipments only.

(b) Paid by mine operator only.

in the Mineral Industry in Canada, by Kinds and Industries, 1939

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased (e)	Total	Electricity generated for own use	Electricity generated for sale	Process supplies †	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
93,539	4,661						31,565,627	3,588,157			
33,583	50,035			185		119,692		27,013	90,610	35,537	72,774
6,680,545	81,539	8,548			777,832,223		80,676,577	6,422,112			
1,016,182	396,821	308		3,557	5,803,160	7,932,580		46,095	19,484,870	694,165	2,249,312
793,568	448				249,300,170		88,466,161	225,413			
70,722	1,695				878,121	1,223,523		676	5,585,616	1,582,350	16,587,402
8,704	423				4,921,586						
1,111	2,441				39,570	63,486			105,500	19,054	49,056
527,229	1,703				58,135,808		6,287,406	35,065			
204,024	20,740			6	274,456	667,661		12,743	1,619,385	1,417,437	994,759
326,871					116,927,832					(d)	(d)
30,910					366,167	475,696			5,641,635		
209,197	1,500				3,574,442						
25,747	4,977			22	30,210	92,405			81,991	1,177	
22,747,830	8,396	3,770	308		3,238,785,269		254,037,320	21,239,000	(e)		
1,061,809	41,364	4,840	302	2,696	7,668,989	15,891,301		135,613	11,773,863	(d)	
31,387,483	98,669	12,313	308		4,449,477,330		461,033,091	31,509,747			
2,444,088	517,573	5,238	302	6,466	15,060,673	26,486,344		222,140	44,383,470	3,749,720	19,953,303
44,333					130,461,057		50,413,999	12,495,580			
7,109					1,483,204	3,222,531		177,876	4,981,284		
4,677	12		155,500		16,599						
261	34		71,782		374	82,877			15,520		
623,145	1,340		6,159,274		1,979,843						
19,893	3,462		624,320		28,068	707,067			724,988		
672,155	1,952		6,314,774		132,457,499		50,413,999	12,495,580			
27,263	3,496		696,102		1,511,643	4,012,475		177,876	5,721,792		
67,575	210				119,936,820						
10,605	756				931,696	1,376,568			2,086,945		
237,919	888				1,283,842		1,130,158				
20,766	3,316			1	15,229	79,114			99,607		
132,177	7		29,155		6,138,524		774,958				
13,147	43		11,662		71,466	193,488			105,831		
90	1,410				128,000				100		
9	4,766				2,576	8,094					
1,371	227				30,000		189,493				
115	725			5	500	7,570			11,444		
84,541			47		1,767,693		4,212,996				
9,265			25		10,840	276,267			37,161		
4,625	35				1,140,199		17,000				
767	8				12,381	15,154			7,178		
1,704,199	2,433	146,854			2,862,866		1,088,712				
76,787	6,883	18,063		4	28,821	260,652			133,705		
2,232,497	5,210	146,854	29,202		133,287,854		7,413,317				
131,461	16,577	18,063	11,687	10	1,073,509	2,216,907			2,481,971		
20,684	30				58,438,700						
2,337	102				589,190	1,705,981			532,058		
45,988	34,566		598,311		9,771,973		508,412				
4,717	120,767		24,253	129	137,175	998,683			108,815		
423,422	50,018		165,914		9,108,478		1,247,789				
16,807	173,403		56,362		49,530	944,592			107,510		
102,017	6		8,655		5,770,228				79,065		
10,056	51		5,053		60,302	195,444					
221,119	2,495		3,000		18,738,435		1,550,890				
23,176	9,717		1,400	22	267,392	456,966			624,918		
813,230	87,115		775,880		101,827,814		3,307,091				
57,093	304,040		87,068	151	1,103,589	4,301,576			1,452,366		
35,105,365	192,346	159,172	7,120,164		4,817,050,497		522,167,498	44,005,327			
2,659,905	841,686	23,301	795,159	6,627	18,749,417	37,017,302		400,016	54,039,599	3,749,720	19,953,303

† Explosives, chemicals, etc.

(c) In addition cost of area, etc. treated totaled \$154,878,498.

(d) Data not available.

(e) Cost includes service charges.

Table 28.—Fuel and Electricity Used for All Purposes

Province	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
Nova Scotia.....Quantity	377,795					3,276	197,410	5,004
\$	1,254,838					19,018	43,935	756
New Brunswick.....Quantity	11,867	11					25,042	
\$	58,172	208					5,057	
Quebec.....Quantity	309,213	33,547	19,932	14,382	191	3,941	591,611	17,089
\$	2,066,583	266,210	155,005	102,091	1,337	40,778	140,757	3,203
Ontario.....Quantity	395,040	352,840	2,030	5,846		235,526	1,006,736	38,597
\$	2,252,230	2,071,420	20,373	41,255		2,169,872	241,602	7,738
Manitoba.....Quantity	44,705		66		6,387	150	116,012	2,567
\$	340,285		1,292		22,289	1,956	39,046	655
Saskatchewan.....Quantity	33,565	60	33	46	37,683	13	117,083	2,587
\$	238,358	460	645	383	59,243	213	32,257	492
Alberta.....Quantity	153,906	398			26,381		67,914	6,635
\$	429,569	2,200			26,074		16,039	1,045
British Columbia.....Quantity	225,286	106	117	44	90,854	67,224	238,345	22,312
\$	875,955	3,524	2,840	1,534	147,687	603,826	67,395	4,078
Yukon.....Quantity	31					6	72,656	1,064
\$	2,313					600	43,850	584
Northwest Territories.,.Quantity	7						23,607	24
\$	485						10,985	12
Canada.....Quantity	1,551,415	356,962	22,178	20,318	161,496	310,136	2,456,416	95,879
\$	7,518,788	2,344,022	180,155	145,263	256,630	2,836,263	640,923	19,163

(a) On outgoing shipments only.

(b) Paid by mine operator only.

Table 29.—Fuel and Electricity Used only for Metallurgical

Province	Bituminous coal		Anthracite coal		Lignite coal	Coke
	Canadian	Imported	From United States	From other countries		
	Tons	Tons	Tons	Tons	Tons	Tons
Quebec.....Quantity	112,684	69				3,459
\$	856,140	509				35,774
Ontario.....Quantity	317,110	120,488				217,136
\$	1,763,247	702,591				2,056,566
Manitoba.....Quantity	26,962					
\$	203,558					
Saskatchewan.....Quantity	26,961					
\$	203,558					
British Columbia.....Quantity	87,615					66,363
\$	407,607					595,749
Canada.....Quantity	571,332	120,557				286,958
\$	3,434,110	703,100				2,688,089

* All used in the non-ferrous smelting and refining industry and included in table.

in the Mineral Industry in Canada, by Provinces, 1939

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased (e)	Total	Electricity generated for own use	Electricity generated for sale	Process †	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
414,513 43,342	5,825 21,291	146,854 18,063		2	92,074,449 1,032,474	2,433,719	25,845,695	8,917,846 92,033	2,991,575	4,519	4,743
9,478 705	11,370 38,710		37,377 17,555		2,252,645 48,670	169,077	153,494		160,461		
8,584,402 529,861	55,325 212,368	2,770 2,840		2,033	2,232,235,124 6,646,182	10,169,248	262,625,969	20,366,000 129,500	12,045,723	885,781	10,276,877
18,037,603 1,139,332	74,525 319,974	9,548 2,398	302,498 124,195	3,759	1,328,529,125 6,749,273	15,143,421	25,593,984	6,491,720 45,444	26,050,348	179,329	1,127,347
415,627 72,820	15,909 68,723				220,951,362 431,971	979,037	7,049,055	553,750 2,768	2,169,548	310,461	3,652,168
1,834,138 98,823	2,471 19,286		2,164 226		139,202,392 138,762	589,148	6,874,809		985,046	869	1,474,111
587,197 16,074	2,026 6,409		6,778,125 653,183		31,882,721 385,783	1,536,976	10,826,561	549,666 38,824	1,967,898		
4,312,853 456,879	16,560 63,227			823	769,922,679 3,316,302	5,544,070	149,086,035	3,529,180 53,366	7,141,721	1,932,255	2,881,570
514,205 214,323	4,699 59,568					321,238	31,584,706	3,597,165 38,081	326,409	428,973	522,030
395,349 87,746	3,636 32,130			10		131,368	2,527,190		200,870	7,533	14,457
35,105,365 2,659,905	192,346 841,686	159,172 23,301	7,120,164 795,159	6,627	4,817,050,497 18,749,417	37,017,302	522,167,498	44,005,327 400,016	54,039,599	3,749,720	19,953,303

Purposes in the Mineral Industry of Canada, by Provinces, 1939*

Gasolene	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manu- factured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
	3,387 708	6,553,877 287,644	1,642 8,632	2,770 2,840			1,681,570,286 3,179,831	4,372,078	245,564,364
4,332 904		15,295,025 673,470	5,863 27,005	1,000 2,000	308 302	2,696	196,539,559 572,774	5,801,555	
		4,800 864	50 350				77,428,000 46,380	251,152	
		4,800 864	50 350				77,428,000 46,379	251,151	
		836,627 96,206	791 5,027				500,785,870 1,879,717	2,984,306	
4,332 904	3,387 708	22,695,129 1,059,048	8,396 41,364	3,770 4,840	308 302	2,696	2,533,751,715 5,725,081	13,660,242	245,564,364

Table 30.—Electricity Purchased by

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total, entire mining industry	
	K.W.H.	\$*	K.W.H.	\$*	K.W.H.	\$*
1925.....	160,192,738	1,413,861	612,062,882	3,542,342	944,819,733	6,927,280
1926.....	169,287,220	1,547,152	1,215,488,195	4,992,979	1,604,089,435	8,780,863
1927.....	221,866,174	1,742,860	1,490,457,194	5,509,534	1,799,505,643	8,025,375
1928.....	224,756,744	2,002,062	1,530,612,608	6,271,434	1,856,391,170	9,072,073
1929.....	233,219,275	1,983,959	1,662,142,083	6,934,286	2,054,411,658	10,353,034
1930 (a).....	213,116,298	1,927,268	1,752,490,909	7,535,324	2,151,082,619	10,929,340
1931 (b).....	253,436,606	2,222,870	1,874,324,568	7,309,118	2,213,264,599	10,514,814
1932.....	314,326,323	2,516,897	1,499,911,795	6,626,600	1,758,083,427	9,615,706

* Includes service charges.

(a) 1925 to 1930 for power only.

(b) 1931-1939 for all purposes.

Table 31.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Province	Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power em- ployed	Electric motors run by primary power in same plant	Boilers
Nova Scotia..... No.	68	34	89	3	194	834	1,025	211	107
H.P.	50,325	4,187	3,128	575	58,815	57,299	115,514	10,696	29,843
New Brunswick... No.	22	1	36	.....	59	203	262	14	21
H.P.	1,939	60	1,113	.....	3,112	2,124	5,236	227	1,240
Quebec..... No.	43	67	193	15	318	6,364	6,682	471	103
H.P.	5,185	8,823	6,853	53,300	74,161	284,437	358,598	6,220	13,481
Ontario..... No.	161	62	436	7	41,666	11,702	12,368	811	256
H.P.	13,898	9,661	15,290	3,150	41,999	417,234	459,233	11,851	28,836
Manitoba..... No.	13	12	30	1	56	1,420	1,476	192	36
H.P.	1,257	2,210	844	1,900	6,811	68,921	75,132	3,099	12,969
Saskatchewan... No.	29	20	38	2	89	807	896	173	20
H.P.	2,075	1,594	1,110	3,300	8,079	42,367	50,446	3,906	7,366
Alberta..... No.	198	5	134	.....	337	1,324	1,661	342	214
H.P.	40,080	458	4,909	.....	45,447	36,848	82,295	8,794	25,666
British Columbia. No.	98	115	119	53	335	3,944	4,329	1,046	72
H.P.	31,039	14,906	3,190	34,125	83,260	174,419	257,679	34,931	11,105
Yukon..... No.	3	18	4	3	28	.....	28	314	2
H.P.	45	2,754	58	15,000	17,857	.....	17,857	13,662	32
N.W.T..... No.	.....	10	4	.....	14	.....	14	9	2
H.P.	.....	1,573	130	.....	1,703	.....	1,703	125	70
Canada..... No.	635	344	1,053	84	2,146	26,598	28,744	3,583	853
H.P.	145,843	46,226	36,625	111,350	340,044	1,083,649	1,423,693	93,511	130,698

Canadian Mining Industry, 1925-1939

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total, entire mining industry	
	K.W.H.	\$*	K.W.H.	\$*	K.W.H.	\$*
1933.....	317,650,168	2,661,852	1,688,075,040	7,115,894	1,908,779,501	9,966,904
1934.....	415,570,323	3,091,147	2,099,586,731	8,433,428	2,359,525,280	11,510,481
1935.....	464,146,582	3,722,163	2,320,385,917	9,415,062	2,591,470,745	12,546,298
1936.....	449,026,003	4,345,066	2,841,045,187	10,783,296	3,151,192,519	14,055,915
1937.....	629,083,378	5,031,691	3,368,047,901	12,442,423	3,744,919,549	16,135,702
1938.....	741,866,953	5,333,427	4,125,037,129	13,917,518	4,441,098,287	17,485,652
1939.....	777,832,223	5,803,160	4,449,477,330	15,060,673	4,817,050,497	18,749,417

Reserve or Idle, in the Mineral Industry in Canada, by Provinces, 1939

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
7	8	16		31	21	52	23	14
1,032	648	1,094		2,774	428	3,202	1,754	2,975
5		8		13	16	29		3
167		118		285	326	611		70
17	10	51	1	79	612	691	46	45
1,034	1,835	3,232	25	6,126	22,177	28,303	583	3,873
36	26	71		133	846	979	31	28
2,885	2,674	4,288		9,847	38,713	48,560	1,011	2,233
1	2	9		12	105	117	4	10
870	450	561		1,881	3,379	5,260	25	1,180
2	6	4		12	70	82	6	7
530	1,143	188		1,861	1,819	3,680	51	1,005
39	4	21		64	55	119	7	19
7,134	20	1,119		8,273	1,985	10,258	166	1,790
15	29	25	15	84	652	736	190	21
3,341	2,615	375	2,242	8,573	17,305	25,878	7,701	1,536
4	2			6		6	90	1
70	202			272		272	4,877	150
	3	1		4		4	6	5
	399	3		402		402	30	195
126	90	206	16	438	2,377	2,815	403	153
17,063	9,986	10,978	2,267	40,294	86,132	126,426	16,198	15,097

Table 32.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Industry	Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
METAL MINING—									
Alluvial Gold Mines..... No.	4	21	44	8	77		77	260	5
H.P.	66	1,536	814	16,680	19,096		19,096	14,854	178
Auriferous Quartz Mines..... No.	34	150	161	33	378	8,894	9,272	1,507	213
H.P.	1,989	25,159	5,850	19,880	52,878	323,854	386,732	25,731	16,422
Copper-Gold-Silver Mines..... No.	4	3	6	8	21	2,016	2,037	281	25
H.P.	10,380	760	555	10,150	21,845	75,765	97,610	13,310	18,249
Silver-Cobalt Mines..... No.			1		1	43	44		3
H.P.			30		30	1,620	1,650		200
Silver-Lead-Zinc Mines..... No.	7	29	8		44	739	783	92	10
H.P.	6,342	4,280	280		10,902	21,080	31,982	914	2,306
Nickel-Copper Mines..... No.						786	786		4
H.P.						47,043	47,043		402
Miscellaneous Metal Mines..... No.		10	11		21	106	127	25	8
H.P.		657	196		863	3,805	4,658	65	140
Non-ferrous Smelting and Refining..... No.	25		1	11	37	6,827	6,864	321	29
H.P.	9,421		65	51,125	60,611	327,381	387,992	4,030	17,389
Total..... No.	74	213	232	60	579	19,411	19,990	2,576	297
H.P.	28,198	32,392	7,790	97,835	166,215	810,548	976,763	58,994	55,286
NON-METAL MINING, INCLUDING FUELS—									
Coal..... No.	253	12	140	2	407	2,379	2,786	530	253
H.P.	80,651	696	2,855	12,000	96,202	97,892	194,094	25,177	51,159
Natural Gas..... No.	7		186		193	27	220	13	8
H.P.	195		5,491		5,686	678	6,364	202	305
Petroleum..... No.	75	5	96		176	137	313	14	84
H.P.	22,338	458	4,528		27,324	660	27,984	380	8,034
Total..... No.	335	17	422	2	776	2,543	3,319	557	345
H.P.	103,184	1,154	12,874	12,000	129,212	99,230	228,442	25,759	59,498
Other Non-Metal Mining									
Asbestos..... No.	7	2	4		13	983	996		7
H.P.	235	220	353		808	51,873	52,681		272
Feldspar, nepheline-syenite and Quartz No.	6	4	18		28	57	85	75	9
H.P.	538	822	809		2,169	1,033	3,202	929	715
Gypsum..... No.	13	20	57		90	182	272	36	12
H.P.	1,285	2,251	2,401		5,987	6,289	12,226	892	1,525
Iron oxides..... No.			5		5	6	11		
H.P.			10		10	76	86		
Mica..... No.	4		11	1	16	22	38	3	1
H.P.	165		250	145	560	12	572	115	40
Salt..... No.	18	3	2		23	108	131	130	8
H.P.	2,210	555	24		2,789	909	3,698	1,642	3,300
Talc and Soap-stone..... No.		3	6		9	24	33	12	
H.P.		267	162		429	465	894	120	
†Miscellaneous..... No.	2	10	13	2	27	114	141	42	5
H.P.	50	1,094	365	150	1,659	2,664	4,323	576	232
Total..... No.	50	42	116	3	211	1,496	1,707	298	42
H.P.	4,483	5,209	4,374	295	14,561	63,321	77,682	4,274	6,084

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1939

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
8	3	5	1	17		17	71	4
110	432	63	19	624		624	5,195	135
22	60	95	8	185	598	783	147	54
1,595	6,869	6,959	1,823	17,246	17,184	34,430	5,965	3,219
4	2	5		11	166	177	26	9
2,120	395	475		2,990	4,560	7,550	1,300	1,195
3		2		5		5		2
235		11		246		246		100
1	6	4	2	13	98	111	79	5
35	300	57	250	642	4,845	5,487	952	330
					66	66		
					1,380	1,380		
1	1	2		4	4	8		1
65	40	43		148	41	189		
3				5	778	781	23	6
1,134				1,184	32,484	33,618	326	2,067
42	72	113	11	238	1,710	1,948	346	81
5,294	8,036	7,608	2,092	23,080	60,494	83,524	13,738	7,046
48		20		68	72	140	27	30
9,863		328		10,191	1,750	11,941	1,770	4,896
1		7		8		8		
35		139		174		174		
5		10		15	10	25	4	5
309		973		1,282	56	1,338	155	460
54		37		91	82	173	31	35
10,207		1,440		11,647	1,806	13,453	1,925	5,356
		2		2	30	32		1
		10		10	3,175	3,185		150
1				1		1	7	1
35				35		35	25	80
1		15		16	6	22		3
30		819		849	210	1,059		200
6				6	2	8		
190				190	41	231		
					5	5		
					190	190		
1	3	1		5	17	22		3
150	890	45		1,085	477	1,562		525
9	3	18		30	60	90	7	8
405	890	874		2,169	4,093	6,262	25	955

Table 33.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement.....No.	2	3	41	.....	46	1,308	1,354	11	10
H.P.	57	825	1,934	.....	2,816	59,272	62,088	796	342
Clay Products...No.	67	4	47	.....	118	544	662	29	54
H.P.	5,539	495	1,250	.....	7,284	14,818	22,102	437	5,003
Lime.....No.	7	5	20	.....	32	273	305	51	18
H.P.	230	421	532	.....	1,188	5,295	6,478	728	1,217
Sand and Gravel..No.	22	14	60	7	103	197	300	.....	18
H.P.	1,017	1,285	2,365	240	4,907	6,997	11,904	.....	990
Stone.....No.	78	46	145	12	281	826	1,107	61	49
H.P.	3,135	4,445	5,506	980	14,066	24,168	38,234	2,613	2,188
Total.....No.	176	72	313	19	580	3,148	3,728	152	149
H.P.	9,978	7,471	11,587	1,220	30,256	110,550	140,806	4,574	9,740
Grand total 1939...No.	635	344	1,083	84	2,146	26,598	28,744	3,583	833
H.P.	145,843	46,226	36,625	111,350	340,044	1,083,649	1,423,693	93,511	130,608
Grand total 1938...No.	659	353	1,044	81	2,137	24,204	26,341	3,553	904
H.P.	145,133	43,816	35,012	101,405	325,366	953,927	1,279,293	93,743	133,453

† Includes data for peat.

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1939

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
		6		6	360	366		5
		327		327	14,062	14,389		214
2	7	9		18	60	78	1	9
160	815	130		1,105	2,568	3,673	10	645
		1		1	25	26		1
		10		10	640	650		75
		4		4	4	8	11	
		117		117	92	209	205	
19	8	18	5	50	76	126	7	14
997	245	472	175	1,889	2,377	4,266	295	716
21	15	38	5	79	525	604	19	29
1,157	1,060	1,056	175	3,448	19,739	23,187	510	1,650
126	90	206	16	438	2,377	2,815	403	153
17,063	9,986	10,978	2,267	40,294	86,132	126,426	16,198	15,007
135	75	198	26	434	2,007	2,441	227	139
22,841	8,263	9,939	3,533	44,576	84,083	128,659	5,588	15,335

Table 34.—Mining Accidents in 1939

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal
UNDERGROUND—																		
Falls of roof or face.....	10	768	1	136	4	109	14	103	1	27	1	50	8	73	2	450	41	1,716
Mine cars and locomotives...	5	512	....	70	....	84	....	....	....	31	....	69	3	47	2	163	10	976
Gas and dust explosions.....	....	....	....	2	....	....	....	....	....	....	....	....	3	....	3	8	6	19
Explosives.....	....	1	....	8	1	20	7	32	....	2	....	5	....	4	2	13	10	85
Electricity.....	....	1	....	10	....	....	....	1	....	1	1	1	....	....	....	3	1	17
Timbering.....	....	....	....	....	....	14	....	....	....	....	....	9	1	18	....	....	1	41
Mining and loading coal.....	....	....	....	....	....	....	....	....	....	....	....	95	....	18	....	....	....	113
Coal cutting machines.....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	5
Miscellaneous...	1	1,156	....	190	5	576	20	1,396	1	148	1	137	....	30	3	1,482	31	5,115
Total....	16	2,438	1	416	10	803	41	1,532	2	209	3	366	15	195	12	2,119	100	8,078
SURFACE—																		
Haulage.....	....	46	....	11	....	76	....	16	1	14	....	41	....	10	....	11	1	225
Machinery.....	....	31	....	14	....	189	2	75	1	11	....	5	....	10	....	17	3	352
Miscellaneous.....	....	191	....	35	8	624	8	623	....	69	....	97	2	22	5	459	23	2,120
Total....	....	268	....	60	8	889	10	714	2	94	....	143	2	42	5	487	27	2,697
Grand Total 1939	16	2,706	1	476	18	1,692	51	2,246	4	303	3	509	17	237	17	2,606	127	10,775
Grand Total 1938	44	2,526	....	356	49	1,858	61	2,147	7	401	3	564	20	208	23	2,432	207	10,492
Grand Total 1933	12	783	....	208	8	349	25	1,513	....	....	4	267	6	169	14	1,061	69	4,350
Grand Total 1928	28	2,575	2	224	24	416	85	2,515	....	....	1	34	28	193	28	1,988	196	7,945

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

Including—(a) The Alluvial Gold Mining Industry; (b) The Auriferous Quartz Mining Industry; (c) The Copper-Gold-Silver Mining Industry; (d) Miscellaneous Data on Monetary Gold and World Gold Production, Prices, Exchange, etc.

Definition of the Industry.—Gold mining in Canada is classified into three principal industries—(a) the recovery of gold from the gravels and sands of stream channels or beaches or what is defined as “The Alluvial Gold Mining Industry”; (b) the recovery of lode gold, which is named “The Auriferous Quartz Mining Industry” and in which industry the gold is usually the most important economic constituent of the ores mined and quartz the predominant gangue mineral; (c) gold is often found in various other mineral deposits, more particularly in those of copper, and for this reason the review of Canada’s “Copper-Gold-Silver Mining Industry” is included here to complete a more comprehensive survey of the Canadian Gold Mining Industry.

Order in Council P.C. 598—February 12, 1940

WHEREAS subsection one of section twenty-five of the Bank of Canada Act, Chapter forty-three of the Statutes of Canada, 1934, provides that the Bank shall sell gold to any person who makes demand therefor at the head office of the Bank and tenders the purchase price in legal tender, but only in the form of bars containing approximately four hundred ounces of fine gold;

AND WHEREAS by Order in Council P.C. 476, dated March 3, 1939, passed under the provisions of subsection two of said section twenty-five of the said Act, the operation of said subsection one of section twenty-five was suspended for a period of one year from and after March 10, 1939.

NOW, THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of Finance and under the provisions of said subsection two of section twenty-five of the Bank of Canada Act is pleased to order that the operation of said subsection one of section twenty-five be and it is hereby suspended for a further period of one year from and after the tenth day of March, 1940, unless sooner rescinded by Order in Council.

Income Tax Exemption to New Mines

With a view to stimulating exploration and development of mineral resources in Canada, certain exemptions from income tax are granted to new or re-opened mines coming into production. An amendment to the Income Tax Act, made in May, 1936, provides that any metalliferous mine coming into production between May 1, 1936, and January 1, 1940, shall be exempt from income tax for its first three fiscal periods following the commencement of production. The Minister of National Revenue, having regard to the production of ore in reasonable commercial quantities, shall determine which mines, whether new or old, qualify for this exemption, and a certificate will be issued accordingly. General regulations covering depletion allowance to precious metal mines are unchanged from the previous year and remain on the basis of $33\frac{1}{3}$ per cent for mining companies, with the allowance in the case of dividends received by shareholders standing at 20 per cent.

In the 1939 session of Parliament an amendment to the Income Tax Act extended for a further three years the qualifying period for the above three-year exemption from January 1, 1940, to January 1, 1943. Provision was also made for an exemption from tax in respect of dividends paid to a company incorporated in Canada by a company which has never paid a tax by reason of the above three-year exemption. It might be explained that under the Income Tax Act a corporation is exempt from tax on dividends received from another corporation if the paying corporation has already paid corporation income tax on its earnings. This is to avoid double taxation of corporate earnings. It is seen, therefore, that but for the exempting amendment here mentioned a receiving corporation would automatically lose the exemption (which it would otherwise enjoy) through the fact that the paying corporation had received the three-year exemption accorded to new mines and thus the purpose of the Government in allowing the three-year exemption would be defeated.

The above mentioned three-year exemption from income tax has been and is available only to new or reopened mines. The 1939 income tax amendments, however, now offer an important and far reaching tax credit to the mining industry as a whole under provisions which are applicable generally to all taxpayers. Briefly stated, the new provisions offer a credit against income tax up to 10 per cent of any capital expenditure undertaken by the taxpayer in the period May 1, 1939 to April 30, 1940, the credit to be taken in three equal annual instalments.

The act to amend the Income War Tax Act assented to on September 13, 1939 was further amended in the 1940 Spring Session of Parliament.

In 1940 under the Excess Profits Tax Act a tax of seventy-five per centum was levied upon the annual excess profits derived from carrying on business in Canada. As an alternative, a minimum tax of twelve per centum is levied upon the total annual profits. The larger of the two taxes is to be paid.

Excess profits are the difference between the profits of the taxation year and the profits of the standard period being the four years 1936, 1937, 1938 and 1939, or fiscal periods ending therein.

Provision is made for adjustment of the standard profits by the Minister to have regard to changes in the length of fiscal periods, to have regard to increases or decreases in the capital employed in the business, or in the case of gold mines and oil wells, to have regard to increases or decreases in the volume of production.

Table 35.—Production of New Gold in Canada, by Provinces and Sources, 1938 and 1939
(Gold at \$20.671834 per fine ounce)

	1938		1939	
	Fine troy ounces	\$	Fine troy ounces	\$
NOVA SCOTIA—				
In gold bullion and ores exported.....	26,500	549,044	29,943	618,977
Estimated exchange equalization on gold produced.....		385,204		463,193
Total Value—Canadian Funds.....		934,248		1,082,170
QUEBEC—				
In anode copper, in ores shipped and in gold bullion.....	881,263	18,217,322	953,377	19,708,051
Estimated exchange equalization on gold produced.....		12,781,104		14,747,947
Total Value—Canadian Funds.....		30,998,426		34,455,998
ONTARIO—				
†Porcupine Area—In gold bullion.....	1,258,671	26,019,038	1,312,702	27,135,958
†Kirkland Lake—In gold bullion (a).....	1,030,829	21,309,126	941,371	19,459,865
†Other gold mines—In gold bullion.....	526,750	10,888,859	754,903	15,605,230
Copper-nickel and other ores.....	80,227	1,658,439	77,100	1,593,798
Total.....	2,896,477	59,875,492	3,086,076	63,794,851
Estimated exchange equalization on gold produced.....		42,008,086		47,739,021
Total value—Canadian Funds.....		101,883,578		111,533,872
MANITOBA—				
In gold bullion, ores shipped and in blister copper.....	185,706	3,838,884	180,875	3,739,018
Estimated exchange equalization on gold produced.....		2,693,325		2,797,985
Total Value—Canadian Funds.....		6,532,209		6,537,003
SASKATCHEWAN—				
In ores shipped to Canadian smelters, crude placer gold and gold bullion.....	50,021	1,034,026	77,120	1,594,212
Estimated exchange equalization on gold produced.....		725,463		1,192,982
Total Value—Canadian Funds.....		1,759,489		2,787,194
ALBERTA—				
In alluvial gold.....	305	6,305	359	7,421
Estimated exchange equalization on gold produced.....		4,423		5,554
Total Value—Canadian Funds.....		10,728		12,975
BRITISH COLUMBIA—				
In alluvial gold.....	46,207	955,183	39,797	822,677
In ores shipped.....	324,031	6,698,315	351,451	7,265,137
In base bullion and in matte, precipitate and ores exported..	235,379	4,865,716	235,722	4,872,806
Total.....	605,617	12,519,214	626,970	12,960,620
Estimated exchange equalization on gold produced.....		8,783,364		9,698,703
Total Value—Canadian Funds.....		21,302,578		22,659,323
YUKON—				
In alluvial gold.....	71,303	1,473,964	85,572	1,768,930
In ore shipped.....	1,065	22,015	(b) 2,173	44,920
Total.....	72,368	1,495,979	87,745	1,813,850
Estimated exchange equalization on gold produced.....		1,049,568		1,357,342
Total Value—Canadian Funds.....		2,545,544		3,171,192
NORTHWEST TERRITORIES—				
In ores shipped.....	6	124	650	13,436
In gold bullion produced.....	6,794	140,444	51,264	1,059,721
Total.....	6,800	140,568	51,914	1,073,157
Estimated exchange equalization on gold produced.....		93,622		893,067
Total Value—Canadian funds.....		239,190		1,876,224
Total for Canada.....	4,725,117	97,676,834	5,094,379	105,310,157
Total estimated exchange equalization on gold produced.....		68,529,156		78,805,794
Grand total value, including exchange.....		166,205,990		184,115,951

NOTE.—In 1938 the estimated average price of a troy ounce of fine gold in Canadian funds was \$35.17; in 1939 the corresponding price was \$36.14.

† Includes relatively small amounts of gold contained in slags, and ore shipped.

(a) Includes production in Larder Lake area.

(b) Includes a small quantity recovered as bullion.

Table 36.—Production of Gold in Canada, by Principal Mines, 1939

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
NOVA SCOTIA						
Avon Gold Mines, Ltd.	29,020	12,064	16,956	3,102	100	(a)
Aulenback Mine	(b)		15	9	8	(a)
Consolidated Mining & Smelting Co. of Canada, Ltd.	10,699	4,549	10,665	6,080	35	(a) (d)
Culode Mine	(b)	1,400	70	60	3	(a)
Guysborough Mines, Ltd.	38,987	6,146	32,841	6,687	100	(a) (e)
Higgins and Lawlor	1,675	355	1,320	252	20	(a) (f)
Home Gold Mines Ltd.	769		769	16	25	(a)
Killag Gold Mines Ltd.	203		203	98	10	(a)
Lacey Gold Mine	6,708	1,435	5,273	225	25	(a) (c) (g)
Mineral Industries Ltd.	1,182	304	878	104	20	(a)
Queens Mines Ltd.	1,544		1,541	619	16	(a)
Seal Harbor Gold Mines Ltd.	91,133		91,133	5,950	200	(a) (c)
Other mines				6,711		
Total—Nova Scotia				29,943		

FOOTNOTES—

(a) Amalgamation.

(b) Data not available.

(c) Cyanidation.

(d) Six tons concentrates stored—1.25 oz. per ton.

(e) 334 tons concentrates stored—0.464 oz. per ton.

(f) Four tons concentrates stored—values not stated.

(g) 34.9 tons concentrates stored—2.18 oz. per ton.

QUEBEC						
Agaura Explorations Ltd.			771	115		(d)
Amn Gold Mines (Quebec) Ltd.	40,616		40,616	5,117	150	(a) (c)
Arntfield Gold Mines Ltd.	121,818		121,730	10,661	350	(c)
Beattie Gold Mines (Quebec) Ltd.	613,800		613,800	67,756	1,500	(c)
Bellevue Quebec Mines Ltd.	77,008	1,985	74,023	19,454	200	(c)
Canadian Malartic Gold Mines Ltd.	244,720		244,720	29,823	700	(c)
Central Cadillac Mines Ltd.	4,267		4,267	584	150	(c)
Cournor Mining Co. Ltd.	86,800	16,961	71,832	13,761	190	(c)
Claveryn Gold Mines Ltd.	1,640	948	692	163	50	(a)
East Malartic Mines Ltd.	353,615		353,615	68,832	1,500	(c)
Francoeur Gold Mines Ltd.	56,927		56,927	9,789	150	(c)
Lake Rose (Quebec) Mines Ltd.	1,800	231	1,568	1,222	25	(a) (c)
Lamaque Mining Co. Ltd.	437,892		437,892	132,684	1,000	(c)
Lapa Cadillac Gold Mines Ltd.	91,696		88,810	9,912	300	(a) (c) (i)
McWatters Gold Mines Ltd.	35,400	1,866	(f) 33,534	(g) 11,832	150	(a) (c)
Mooshla Gold Mines Ltd.	3,281	671	2,610	2,029		
O'Brien Gold Mines Ltd.	61,938		61,127	35,865	165	(a) (c)
Perron Gold Mines Ltd.	206,037	73,061	132,976	40,436	340	(c)
Powell Rouyn Gold Mines Ltd.	260,802		255,020	36,203		(g)
Sigma Mines (Quebec) Ltd.	256,227		256,227	55,949	300	(c)
Siscoe Gold Mines Ltd.	218,577	28,485	189,556	53,982	600	(a) (c)
Sladen-Malartic Mines Ltd.	181,416	14,460	183,429	17,855	500	(c)
Stadacona Rouyn Mines, Ltd.	131,653		131,653	19,545	500	(c)
Sullivan Consolidated Mines Ltd.	146,685	19,144	123,214	32,358	335	(a) (c)
Thompson Cadillac Mining Corp.	42,381		42,381	4,089	200	(a) (c)
Wood Cadillac Mines Ltd.	3,097		2,867	388	225	(a) (c) (h)
Other gold mines	(b)	(b)	(b)	29	(b)	
Copper-gold-silver ores				272,944		
Total—Quebec				953,377		

FOOTNOTES—

(a) Amalgamation.

(b) Data not available.

(c) Cyanidation.

(d) Crude ore to Noranda—samples.

(e) Includes gold in concentrates smelted.

(f) In addition 2,006 tons of tailings retreated.

(g) Crude ore smelted.

(h) Milling commenced December 8.

(i) Includes 760 tons tailings retreated.

ONTARIO						
Porcupine District—						
Broulan Porcupine Mines Ltd.	15,300		14,911	2,746	300	(d)
Buffalo Ankerite Gold Mines Ltd.	372,028		360,014	72,393	1,000	(c)
Coniaurum Mines Ltd.	187,405		187,405	48,189	600	(c)
Delnita Mines Ltd.	110,622		111,395	22,726	300	(c)
De Santos Porcupine Mines Ltd.	35,015	2,666	35,539	6,659	160	(c)
Dome Mines Ltd.	615,000		615,000	205,480	1,500	(a) (c)
Hallnor Mines Ltd.	123,532		122,868	71,555	400	(c)
Hollinger Consolidated Gold Mines Ltd. (Ross)	55,730		55,727	13,913	225	(c)
Hollinger Consolidated Gold Mines Ltd. (Timmins)	1,696,646		1,700,355	425,614	6,000	(c)
Mace Gold Mines Ltd.	37,515		37,515	5,167	300	(c) (e)
McIntyre Porcupine Mines Ltd.	877,830		877,830	231,744	2,500	(c)
Moneta Porcupine Mines Ltd.	62,641		63,206	29,593	175	(c)
Naybob Gold Mines Ltd.	44,987		44,271	7,168	150	(c)
Pamour Porcupine Mines Ltd.	585,599		585,399	70,447	1,500	(c)
Paymaster Consolidated Mines Ltd.	200,020	5,081	201,775	42,353	550	(c)
Porcupine Lake Gold Mining Co. Ltd.	1,201		1,191	136	25	(a) (f)
Preston East Dome Mines, Ltd.	120,404		118,853	56,810	400	(a) (c)

Table 36.—Production of Gold in Canada, by Principal Mines, 1939—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
ONTARIO—Concluded						
Kirkland Lake District—						
Bidgood Kirkland Gold Mines, Ltd.....	53,003		53,191	13,263	125	(c)
Golden Gate Mining Co. Ltd.....	23,753		23,753	7,341	125	(a) (c)
Kirkland Lake Gold Mining Co. Ltd.....	99,401		99,401	47,323	270	(c)
Lake Shore Mines Ltd.....	856,586		(g) 856,586	368,320	2,300	(c)
Macassa Mines Ltd.....	147,915		148,085	63,886	400	(c)
Sylvanite Gold Mines Ltd.....	199,754		201,331	68,249	570	(c) (h)
Teck-Hughes Gold Mines Ltd.....	379,175		379,175	94,775	1,000	(c)
Toburn Gold Mines Ltd.....	64,493	9,221	55,272	33,506	150	(c)
Upper Canada Mines Ltd.....	47,232		47,014	18,801	200	(c)
Wright-Hargreaves Mines Ltd.....	438,710		438,710	225,907	1,200	(c)
Larder Lake District—						
Chesterville Larder Lake Gold Mines Ltd	97,060		97,060	13,172	500	(c)
Kerr-Addison Gold Mines Ltd.....	268,409		268,409	54,480	1,000	(a) (c)
Laguette Gold Mines Ltd.....	15,303	1,178	14,125	1,517	75	(c)
Omega Gold Mines Ltd.....	176,796		176,796	24,228	500	(c)
Matachewan District—						
Hollinger Consolidated Gold Mines, Ltd. (Young-Davidson).....	376,334		376,265	39,394	1,000	(c)
Matachewan Consolidated Mines Ltd....	155,238		155,238	23,743	300	(c)
Ronda Gold Mines Ltd.....	24,592		24,592	2,727	125	(c) (i)
Tyranite Mines Ltd.....	42,200	1,790	35,752	5,235	200	(c)
Sudbury District—						
Lebel Oro Mines Ltd.....	20,012		20,462	3,990		(k)
Consolidated Mining & Smelting Co. of Canada, Ltd. (Golden Rose).....	36,534		36,195	12,608	100	(c)
Tionaga Gold Mines Ltd.....	5,589	684	4,531	1,669	(b)	(a)
Algoma District—						
Agawa Porcupine Mines Ltd.....	8,612		8,612	510	50	(a)
Algoma Summit Gold Mines Ltd.....	1,768		1,751	228	500	(a) (1)
Cline Lake Gold Mines Ltd.....	81,877		86,085	22,347	200	(c)
Hiawatha Gold Mines Ltd.....	2,571	209	1,928	129	25	(a)
Minto Gold Mines Ltd.....	11,770		11,770	1,566	100	(c)
Ronson Mines Ltd.....	1,034	260	774	156	25	(a)
Thunder Bay District—						
Bankfield Cons. Mines Ltd.....	47,585		47,566	16,313	130	(a) (c)
Hard Rock Gold Mines Ltd.....	143,625	36,539	107,086	21,975	300	(c)
Jellicoe Mines Ltd.....	8,790		3,015	1,188		(m)
Leitch Gold Mines Ltd.....	35,848	4,637	31,206	21,493	75	(a) (c) (n)
Little Long Lac Gold Mines Ltd.....	133,823	27,048	106,775	46,560	300	(a) (c)
McLeod-Cockshutt Gold Mines Ltd.....	255,102	47,027	208,095	45,170	600	(c)
Magnet Cons. Mines Ltd.....	14,065	584	17,493	12,277	150	(a) (c)
Northern Empire Mines Co. Ltd.....	72,076	4,332	67,914	25,502	180	(c)
St. Anthony Gold Mines Ltd.....	30,561	7,182	23,792	8,052	125	(c)
Sand River Gold Mining Co. Ltd.....	46,614	10,096	36,518	12,039	75	(c)
Sturgeon River Gold Mines Ltd.....	42,541	16,259	26,282	12,049	75	(a) (c)
Tombill Gold Mines Ltd.....	38,704		38,704	16,884	100	(a) (c)
Kenora and Rainy River Areas—						
Elora Gold Mines Ltd.....	3,401		3,401	557	(b)	(a)
Kenopo Mining & Milling Co. Ltd.....	(b)		45	13	24	(a)
Kenricia Gold Mines Ltd.....	15,870	4,679	15,668	1,530	100	(c)
Straw Lake Beach Gold Mines Ltd.....	21,448	2,153	19,295	6,632	60	(a) (o)
Wendigo Gold Mines Ltd.....	42,406	8,171	34,235	10,337	80	(a) (o)
Patricia District—						
Berens River Mines Ltd.....	19,217		19,217	5,775	225	(p) (o)
Central Patricia Gold Mines Ltd.....	108,452	361	108,091	48,535	200	(c)
Cochenour Willans Gold Mines Ltd.....	9,935		9,070	3,451	150	(a) (c)
Gold Eagle Gold Mines Ltd.....	53,622	8,248	45,374	9,541	125	(c)
Hasaga Gold Mines Ltd.....	79,576	21,392	58,184	12,522	125	(a) (c)
Howey Gold Mines Ltd.....	543,912	94,424	449,488	31,305	1,250	(c)
J. M. Consolidated Gold Mines Ltd.....	39,979	4,430	35,549	7,565	100	(c)
Madsen Red Lake Gold Mines Ltd.....	136,955		136,929	26,151	400	(a) (c)
McKenzie Red Lake Gold Mines Ltd.....	85,679	15,234	70,445	30,325	200	(c)
Pickle Crow Gold Mines Ltd.....	158,258	31,189	126,959	79,592	400	(a) (c)
Sachigo River Exploration Co. Ltd.....	17,257	6,498	10,699	14,804	25	(a) (c)
Uchi Gold Mines Ltd.....	108,930		103,122	18,355	500	(a) (c)
Eastern Ontario—						
Consolidated Mining & Smelting Co. of Canada, Ltd. (Cordova).....	5,579		6,908	379	125	(c)
Other gold mines.....				342		
Nickel-copper ores.....				77,100		
Total—Ontario.....				3,086,076		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not recorded.
 (c) Cyanidation.
 (d) Commenced milling in November..
 (e) Milling ceased November 1.
 (f) Milling ceased March 14.
 (g) In addition 80 tons tailings retreated.
 (h) Also treated 1,492 tons from dump.
 (i) Milling commenced June 16.
 (j) Closed down August 9.
 (k) Plant dismantled October.
 (l) Taken over by Magino Mines Ltd.
 (m) Milled by Magnet Cons. Mines.
 (n) In addition 91 tons concentrates stored 2.18 oz. gold per ton.
 (o) Concentrates smelted.
 (p) In addition 70 oz. gold contained in concentrates stored, also ore has a relatively high silver content.

Table 36.—Production of Gold in Canada, by Principal Mines, 1939—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
MANITOBA						
Beresford Lake Mines Ltd.....	6,000	.....	6,000	2,395	40	(a)
God's Lake Gold Mines Ltd.....	72,605	.....	72,605	25,814	200	(a) (c)
Gunnar Gold Mines Ltd.....	49,579	543	49,036	18,193	150	(c)
Gurney Gold Mines Ltd.....	64,840	21,251	43,589	9,621	125	(c)
Laguna Gold Mines Ltd.....	38,786	7,079	31,707	16,540	50	(a) (c) (d)
San Antonio Gold Mines Ltd.....	117,780	.....	117,787	34,237	300	(a) (c)
Other gold mines.....	(b)	(b)	(b)	177	(b)	.....
Copper-gold-silver ores.....	.....	.....	.....	73,898	.....	.....
Total—Manitoba.....	.....	.....	.....	180,875	.....	.....

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not available.
 (c) Cyanidation.
 (d) Property now closed down.

SASKATCHEWAN						
Consolidated Mining & Smelting Co. of Canada, Limited (Box).....	(b)	.....	179,985	8,555	1,000	(c)
Alluvial deposits.....	(b)	(b)	(b)	63	.....	.....
Copper-gold-silver ores.....	.....	.....	.....	68,502	.....	.....
Total—Saskatchewan.....	.....	.....	.....	77,120	.....	.....

FOOTNOTES—

- (c) Cyanidation.
 (b) Data not recorded.

ALBERTA						
Placer gold.....	(x)	(x)	(x)	359	.....	.....

(x) No record.

BRITISH COLUMBIA						
Armandy Mine.....	(b)	(b)	122	49	.....	(d)
Anderson, Carl A. (Humming Bird).....	96	200	94	51	.....	(d)
Ashloo Gold Mines Ltd.....	(b)	.....	1,187	653	25	(d)
Bayonne Cons. Mines Ltd.....	114	.....	114	516	50	(a) (c) (d) (e)
Bralorne Mines Ltd.....	184,922	.....	184,922	104,862	500	(a) (d)
Buena Vista Mining Co. Ltd.....	202,321	.....	202,321	15,963	500	(c)
Cariboo Gold Quartz Mining Co. Ltd.....	110,208	.....	110,208	45,809	300	(c)
Cariboo-Hudson Gold Mines Ltd.....	.....	.....	(Data not available)			
Central Zeballos Gold Mines Ltd.....	(b)	.....	14	33	.....	(d)
Clubine Comstock Gold Mines Ltd.....	711	.....	711	578	.....	(d)
Daylight Gold Mines Ltd.....	200	.....	200	70	.....	(d)
Fairview Amalgamated Gold Mines Ltd.....	15,500	.....	15,500	1,502	150	(d)
Fox, F. H. (Alexandria).....	(b)	(b)	51	34	.....	(c)
Gold Belt Mining Co. Ltd.....	57,838	.....	57,838	16,568	150	(c)
Greenbridge Gold Mines Ltd.....	(b)	(b)	141	68	.....	(d)
Havilah Gold Mines Ltd.....	(b)	(b)	1,039	243	.....	(d)
Hedley Mascot Gold Mines Ltd.....	68,590	.....	67,572	15,847	175	(d)
Highland Surprise Gold Mines Ltd.....	(b)	.....	197	198	.....	(d)
Island Mountain Mines Co. Ltd.....	46,209	.....	46,209	20,154	110	(c)
Kelowna Exploration Co. Ltd.....	90,251	.....	90,204	32,152	250	(c) (d)
Kootenay Belle Gold Mines Ltd.....	52,666	.....	52,666	18,733	150	(c)
Livingstone Mining Co.....	1,296	.....	1,296	719	.....	(d)
Maybee Mine.....	153	.....	153	81	.....	(d)
McArthur, W. E. (Brooklyn-Stemwinder).....	17,236	.....	17,236	2,841	50	(d)
McArthur, W. E. (Number 7).....	447	.....	447	152	.....	(d)
McDames Lake Mining Co. Inc.....	(b)	(b)	(b)	114	7	(a)
Monashee Development Co. Ltd.....	1,566	.....	1,566	308	50	(d)
Mt. Zeballos Gold Mines Ltd.....	8,821	2,484	6,377	3,277	50	(a) (d)
Oscarson, R. (Arlington).....	783	.....	783	1,193	.....	(d)
Osoyoos Mines of Canada Ltd.....	45,962	.....	45,962	5,370	150	(c) (d)
Pioneer Gold Mines of B.C. Ltd.....	103,738	15,937	88,009	43,570	300	(a) (c)

Table 36.—Production of Gold in Canada, by Principal Mines, 1939—Concluded

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
BRITISH COLUMBIA—Concluded						
Polaris-Taku Mining Co. Ltd.....	69,045	.....	68,968	16,995	150	(d) (f)
Privateer Mine Ltd.....	38,262	11,442	26,820	32,987	75	(a) (c)
Relief Arlington Mines Ltd.....	51,700	19,559	31,498	14,896	75	(c)
Reno Gold Mines Ltd.....	16,085	.....	16,421	7,207	120	(a) (c)
Sheep Creek Gold Mines Ltd.....	55,558	.....	55,558	27,750	150	(c)
Silbak Premier Mines Ltd.....	169,164	.....	169,164	40,417	500	(d) (g)
Spud Valley Gold Mines Ltd.....	35,607	14,657	20,950	15,369	50	(a) (d) (h)
United Prospectors Ltd. (Thistle).....	2,038	.....	2,038	706	.....	(d)
Venango Gold Mines Ltd.....	512	.....	512	240	.....	(d)
Venus Juno Mine.....	184	.....	184	212	.....	(d)
Vidette Gold Mines Ltd.....	6,449	.....	6,522	3,206	60	(d)
White Star Mine Ltd.....	358	.....	358	2,122	.....	(d)
Windpass Gold Mining Co. Ltd.....	(b)	1,940	5,236	1,338	50	(d) (i)
Wukelick, J. P. (Grandora).....	(b)	150	309	206	20	(a) (d)
Yankee Bay Mine.....	463	.....	463	345	.....	(d)
Ymir Cons. Gold Mines Ltd.....	9,595	1,250	9,099	3,902	100	(d) (j)
Ymir Yankee Girl Gold Mines Ltd.....	47,317	.....	47,218	12,594	100	(d) (c)
Placer gold.....	.....	.....	(1)4,779,407	39,797	.....	.....
Copper-gold ores.....	.....	.....	.....	52,335	.....	.....
Silver-lead and other gold mines.....	.....	.....	.....	22,638	.....	.....
Total—British Columbia.....	.....	.....	.....	626,970	.....	.....

FOOTNOTES—

(l) Partly estimated—cubic yds.

(a) Amalgamation.

(b) Not recorded.

(c) Cyanidation.

(d) Ore or concentrates shipped to smelter.

(e) Property closed down.

(f) In addition 1,555 tons concentrates on hand December 31 (3-659 oz. per ton).

(g) Ore high in silver values.

(h) In addition 56 tons concentrates stored (5-70 oz. per ton).

(i) Includes 6,800 tons retreated tailings.

(j) Tonnage of concentrates shipped estimated to include some 1938 mill output.

YUKON						
Placers.....	.....	.....	(1)10,398,000	85,572	.....	.....
La Forma (quartz).....	(x)	(x)	892	1,146	(x)	(a) (b)
Silver-lead ores.....	.....	.....	.....	1,027	.....	.....
Total—Yukon.....	.....	.....	.....	87,745	.....	.....

FOOTNOTES—

(x) No record.

(l) Cubic yards, partly estimated.

NORTHWEST TERRITORIES						
Consolidated Mining and Smelting Co. of Canada, Limited (Con).....	38,857	.....	39,077	33,633	125	(a) (c)
Consolidated Mining and Smelting Co. of Canada, Limited—Rycon Mine.....	4,357	.....	4,386	1,511	.....	(d)
Negus Mines Ltd.....	(x)	.....	18,996	15,995	50	(x)
Other Gold Mines.....	(x)	(x)	(x)	772	.....	.....
Silver ores.....	(x)	(x)	(x)	3	.....	.....
Total—Northwest Territories.....	.....	.....	.....	51,914	.....	.....

FOOTNOTES—

(x) Not recorded.

(a) Amalgamation.

(b) In ores smelted.

(c) Cyanidation.

(d) Treated in Con mill.

Grand Total—Canada.....	5,094,379
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Table 37.—Production of Gold in Canada, 1929-1939

Year	Fine ounces	Value*	Value in Canadian funds	Year	Fine ounces	Value*	Value in Canadian funds
		\$				\$	\$
1929.....	1,928,308	39,861,663	.....	1935.....	3,284,890	67,904,700	115,595,279
1930.....	2,102,068	43,453,601	.....	1936.....	3,748,028	77,478,612	131,293,421
1931.....	2,693,892	55,687,688	58,093,396	1937.....	4,096,213	84,676,235	143,326,493
1932.....	3,044,387	62,933,063	71,479,373	1938.....	4,725,117	97,676,834	166,205,990
1933.....	2,949,309	60,967,626	84,350,237	1939.....	5,094,379	105,310,157	184,115,951
1934.....	2,972,074	61,438,220	102,536,553				

NOTE.—For years 1858 to 1928, see previous reports.

* Calculated from the value \$1=0.048375 ounces.

Table 38.—World Production of Gold Ore, 1936-1939

(In terms of metal) (Fine troy ounces) Supplied by Imperial Institute

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE—				FOREIGN COUNTRIES—Cont.			
United Kingdom.....	60	2,428	.....	Sweden.....	193,222	234,116	.....
Anglo-Egyptian Sudan.....	7,388	8,866	7,693	U.S.S.R. (d).....	5,000,000	5,000,000	4,500,000
Bechuanaland Protectorate.....	17,577	18,653	17,219	Yugoslavia.....	87,560	78,000	(a)
Gold Coast.....	559,212	674,927	795,207	Abyssinia.....	(a)	(a)	(a)
Kenya.....	54,774	69,000	77,444	Belgian Congo.....	419,654	450,000	515,000
Nigeria.....	26,466	24,815	23,988	Cameroon (French).....	14,224	15,541	(a)
Northern Rhodesia.....	4,228	1,792	4,645	Egypt.....	1,226	2,162	3,877
Southern Rhodesia.....	804,219	814,073	795,613	Eritrea.....	(a)	(a)	(a)
Sierra Leone.....	35,717	30,443	33,494	French Equatorial Africa.....	21,489	35,518	(a)
South West Africa.....	2,804	1,796	3,059	French West Africa (ex-ports).....	119,000	118,000	(a)
Swaziland.....	2,410	1,246	983	Liberia (exports).....	2,457	1,902	(a)
Tanganyika Territory.....	75,281	81,857	130,372	Madagascar.....	13,500	13,760	(a)
Uganda (exports).....	16,947	20,502	15,281	Morocco (French).....	4,630	1,410	(a)
Union of South Africa.....	11,734,575	12,161,392	12,821,507	Mozambique.....	(a)	9,823	11,064
Canada.....	4,096,213	4,725,117	5,094,379	Costa Rica.....	16,920	17,994	(a)
Newfoundland.....	22,470	24,246	(a)	Dominican Republic.....	6,397	5,898	6,304
British Guiana.....	35,993	38,482	36,267	Guatemala.....	4,190	5,489	4,897
Burma.....	1,004	1,209	(a)	Honduras.....	33,526	30,281	(a)
Cyprus (c).....	23,650	29,245	16,393	Nicaragua.....	24,242	44,506	(a)
Federated Malay States.....	33,828	40,209	40,283	Panama.....	(a)	(a)	(a)
Unfederated Malay States.....	519	581	880	Porto Rico.....	17	9	(a)
India.....	330,744	321,138	314,518	Salvador.....	8,564	6,506	5,307
Sarawak.....	19,214	18,520	(a)	Mexico.....	846,381	923,798	944,117
Straits Settlements.....	.....	5	3	United States.....	4,117,078	4,267,469	4,620,565
Australia.....	1,381,135	1,592,035	1,650,000	Argentina.....	10,500	8,423	12,249
Fiji.....	24,917	92,362	107,789	Bolivia (exports).....	4,267	9,922	8,420
New Guinea.....	217,152	236,126	241,296	Brazil.....	145,754	142,964	148,351
New Zealand.....	168,487	152,050	178,955	Chile.....	315,553	278,532	325,026
Papua.....	22,153	27,000	28,000	Colombia.....	442,222	520,717	570,017
Total.....	19,720,000	21,209,000	22,435,000	Dutch Guiana (crude).....	12,766	14,153	(a)
FOREIGN COUNTRIES—				Ecuador.....	70,906	70,544	80,000
Bulgaria (estimated).....	50	200	(a)	French Guiana (exports).....	45,557	40,637	(a)
Czecho-Slovakia.....	9,552	(a)	(a)	Peru.....	205,350	260,326	270,000
Finland.....	4,019	4,800	(a)	Venezuela.....	116,517	114,984	(a)
France.....	66,420	87,160	(a)	Formosa (estimated).....	112,000	(a)	(a)
Germany.....	8,028	(a)	(a)	French Indo-China.....	10,127	8,745	(a)
Hungary.....	10,448	(a)	(a)	Japan.....	723,400	(b)740,000	(a)
Italy.....	6,700	12,380	(a)	Korea (estimated).....	850,000	1,050,000	(a)
Norway.....	96	26	(a)	Netherlands East Indies.....	55,616	76,300	81,182
Portugal.....	3,982	6,186	(a)	Philippine Islands.....	716,967	903,255	990,569
Roumania.....	175,719	216,405	175,218	Siam.....	12,718	13,736	12,711
Spain (estimated).....	(a)	(a)	(a)	Total.....	15,300,000	15,842,000	18,300,000
				*World's Total.....	35,000,000	37,052,007	35,700,000

* Gold is produced in China and Manchuria—an allowance for this production is made in the total.

(a) Information not available.

(b) Estimated.

(c) Exports.

(d) Approximate figures only. It is not possible to form any reliable estimate from the data given in Russian publications.

Table 39.—Source of Canadian Fine Gold Production, by Percentages, 1934-1939

	1934	1935	1936	1937	1938	1939
	%	%	%	%	%	%
In alluvial gold.....	2.0	1.84	2.27	2.20	2.50	2.47
In crude gold bullion*.....	78.68	78.83	77.37	80.20	80.80	82.14
In base bullion (from silver-lead ores, etc.).....	1.09	2.17	1.60	0.90	0.92	0.63
In blister and anode copper.....	13.41	13.21	13.80	11.70	11.24	10.36
In ores, matte, slags, etc., exported.....	4.82	3.95	4.96	5.00	4.54	4.40
	100.00	100.00	100.00	100.00	100.00	100.00

* Includes a relatively small quantity of gold contained in interprovincial shipments of gold ores to smelters.

Gold Exports—(Order in Council P.C. 4188, December 20th, 1939)

WHEREAS by Order in Council, P.C. 1150, dated May 17, 1932, regulations respecting the export of gold, whether in the form of coin or bullion, from the Dominion of Canada, were made under the authority of The Gold Export Act;

AND WHEREAS the said regulations were by Order in Council, P.C. 3189, dated December 20, 1938, continued in force until December 31, 1939;

AND WHEREAS in the opinion of the Minister of Finance it is expedient that the said regulations be continued in force beyond December 31, 1939;

NOW, THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of Finance and under the provisions of the said "The Gold Export Act", is pleased to order that the provisions of the said Regulations be and they are hereby continued in force and effect until December 31, 1940, unless sooner rescinded by Order in Council.

NOTE.—Order in Council P.C. 1150, reads, in part, as follows—"The export of gold, whether in the form of coin or bullion (including ore, etc.), from the Dominion of Canada, is hereby prohibited, except in such cases as may be deemed advisable by the Minister of Finance, and under licence to be issued by him . . ."

GOLD IN CANADIAN EXPORT TRADE

Exports of gold in Canadian trade statistics were distinguished in previous reports as between monetary and non-monetary. Monetary gold exports were described as those which entailed a reduction in the Dominion's monetary gold stocks. All other gold exported (classed as non-monetary) were shown as merchandise, and included with the total merchandise exports.

The fact that gold is a money metal gives it peculiar attributes which distinguish it from other commodities in trade. In particular, the movement of gold in international trade is determined almost exclusively by monetary factors. The amount of exports may fluctuate widely from month to month owing to other than ordinary trade or commercial considerations. In addition, gold is generally acceptable. It does not have to surmount tariff barriers and is normally assured a market at a relatively fixed price. For these reasons provision was made in previous trade reports for a supplementary table showing exports from Canada excluding all gold.

It is further to be noted gold does not move in international trade in any direct or normal relation to sales and purchases. It may be bought or sold abroad without moving in or out across the frontier, the sales or purchases in such cases being recognized by simply getting aside or "earmarking" the gold in the vaults of the central bank. Trade statistics deal only with physical movements, sales or purchases of gold which do not involve an actual movement, being more properly regarded as an "invisible item" and taken care of in the "International Balance of Payments" statements. Changes in the Bank of Canada's stock of gold under earmark do not enter, therefore, into the trade statistics.

DOMINION BUREAU OF STATISTICS

The publication of statistics showing the gross imports and exports of gold has been temporarily suspended as from September, 1939. Statistics for periods prior to this time have been accordingly revised to exclude all gold formerly included in the total of merchandise exports.

Statistics showing the *net* exports of non-monetary gold, including changes in stocks held under earmark, are published as a supplement to the trade figures, and are given below.

Table 40.—Net Exports of Non-Monetary Gold

	1936	1937	1938	1939
	\$	\$	\$	\$
000,000's omitted				
January.....	10.8	10.1	11.0	18.1
February.....	12.1	10.8	11.2	12.9
March.....	8.7	16.3	17.6	15.5
April.....	11.9	10.3	9.3	10.6
May.....	8.6	10.3	14.3	15.9
June.....	11.3	13.5	11.5	17.2
July.....	9.0	10.1	11.5	15.2
August.....	10.5	12.3	16.6	9.0
September.....	10.3	11.6	15.1	17.3
October.....	13.4	11.3	15.5	22.8
November.....	13.6	12.1	15.3	15.0
December.....	11.5	16.4	11.6	14.9
Twelve Months December.....	131.7	145.1	160.5	184.4

Table 41.—Imports of Gold into the United States, 1934-1940 (United States Department of Commerce)

Year and month	Ore and base bullion		Bullion, refined		United States coin	Foreign coin	Total
	Ounces	\$	Ounces	\$	\$	\$	\$
1940—March.....	277,389	9,667,972	12,854,890	449,555,258	70	621,373	459,844,673
February.....	219,933	7,695,016	5,163,245	180,523,248		13,256,855	201,475,119
January.....	250,020	8,667,198	6,416,576	223,695,681		4,050,606	236,413,485
(000's omitted)							
1939.....	2,679	92,764	99,426	3,476,103	1	5,797	3,574,659
1938.....	2,240	77,628	53,920	1,885,628		16,201	1,979,458
1937.....	2,150	74,215	44,469	1,554,667	2	2,640	1,631,523
1936.....	2,133	73,705	30,519	1,067,680	2	2,730	1,144,117
1935.....	2,103	72,718	45,103	1,578,635	5,375	84,250	1,740,979
1934.....	1,119	36,274	32,678	1,140,764	7,179	2,454	1,186,671

Table 42.—Estimated Average Monthly Value of an Ounce of Fine Gold, Expressed in Canadian Funds, 1931 and 1938-1939

Month	1931	1938	1939
	\$	\$	\$
January.....	20.71	34.99	35.30
February.....	20.67	35.00	35.19
March.....	20.67	35.05	35.13
April.....	20.68	35.15	35.15
May.....	20.68	35.22	35.13
June.....	20.73	35.36	35.07
July.....	20.74	35.24	35.06
August.....	20.73	35.12	35.01
September.....	21.55	35.12	37.21
October.....	23.22	35.32	38.43
November.....	23.22	35.25	38.50
December.....	25.01	35.28	38.50
Yearly average.....	21.55	35.17	36.14

NOTE.—At December 29th, 1939, the price paid by the United States Treasury for gold purchased by the Mint continued at \$35 per troy ounce of fine gold, less $\frac{1}{2}$ of 1 per cent. Actual payment by the United States Treasury for gold in imported and domestic ore or concentrate was at 99.75 per cent of the price quoted by the Treasury, which, at the close of 1939, was equal to \$34.9125 per ounce.

For data 1932-1937, see Annual Report for 1937.

Table 43.—Precious Metals Consumed by the Jewellery and Silverware Industry in Canada, 1938 and 1939

Materials	Cost at works	
	1938	1939
	\$	\$
Precious metals—		
Fine gold.....	930,836	1,187,238
Gold alloys.....	494,965	94,683
Fine silver.....	505,038	644,750
Silver alloys.....	361,555	400,947
Patinum.....	85,503	160,688
Old gold for refining, jewellers' findings, scrap, etc., for refining.....	1,709,946	1,482,950
Gold-filled wire and stock.....	94,301	141,965
Precious and semi-precious stones.....	455,056	498,452

ROYAL CANADIAN MINT

The Ottawa Mint, established as a branch of the Royal Mint under the (Imperial) Coinage Act, 1870, and opened up on January 2, 1908, was by 21-22 Geo. V, C.48, constituted a branch of the Department of Finance and since December 1, 1931, has operated as the Royal Canadian Mint. The great development of the gold mining industry in Canada has resulted in gold refining becoming one of the principal activities of the Mint. Gold coins have never been a popular medium of exchange in Canada and have not been struck since 1919, most of the fine gold produced from the rough shipments from the mines being delivered to the Department of Finance in the form of bars, the rest being sold in convenient form to manufacturers.

The domestic gold currency of Canada, as at present authorized by the Currency Act, consists of \$20, \$10, \$5 and \$2½ gold pieces, 900 millesimal fineness (only \$10 and \$5 have been issued). Gold was used only to an insignificant extent as a circulating medium in Canada, its monetary use being practically confined to reserves; \$5 and \$10 gold pieces weighing respectively 129 and 258 grains, 900ths pure gold by weight, have been coined, the Canadian gold dollar thus containing 23·22 grains of pure gold. The \$5, \$10 and \$20 gold coins of the United States, which contain exactly the same weight of gold as Canadian Gold coins of these denominations, are legal tender for their face value only, as are the British sovereigns, which are legal tender for \$4·86½, their equivalent in Canadian gold dollars.

The regulations in part for the receipt of gold bullion at the Royal Canadian Mint, Ottawa, are as follows:—Each parcel of bullion for which a separate assay is required shall be regarded as a separate deposit, and no ingot exceeding 1,500 ounces troy, gross weight, will be accepted. All deposits shall be dealt with in the order in which they are received. Deposits containing, by assay, less than 200 parts of gold in 1,000, or appearing, either before or after melting and assaying, to be unsuitable for treatment by the refining process in use, may be rejected. A deposit so rejected shall be returned to the depositor on payment by him of any costs incurred for melting and assaying.

The Mint charges, to be calculated on the gross weight of the deposit after melting, shall be as follows:—

(a) For melting and assaying—one dollar for the first four hundred ounces or part thereof and twenty-five cents for each additional one hundred ounces or part thereof.

(b) For refining—when the deposit contains not more than 5 per cent base metal, 3 cents the ounce. Over 5 per cent but not over 10 per cent base metal, 3½ cents the ounce. Over 10 per cent but not over 15 per cent base metal, 4½ cents the ounce. Over 15 per cent but not over 20 per cent base metal, 5 cents the ounce. On deposits which contain over 20 per cent base metal, or which require other treatment, a charge not exceeding 10 cents the ounce, to be determined by the cost of treatment.

The minimum charge for refining shall be two dollars for each deposit and the charge for refining shall apply to all deposits containing by assay less than 995 parts fine gold in 1,000.

An additional handling charge at the rate of 35 cents the ounce fine, to cover costs of realization in a market outside Canada, shall be made on all newly mined Canadian gold deposited with the Mint, and this charge shall be increased to \$1.00 the ounce fine on all other gold accepted as a deposit.

The gross value of gold deposited for sale with the Royal Canadian Mint or the Dominion of Canada Assay Office, Vancouver, shall be the market price of gold in the country to which the Government is at the time of the receipt of the deposit exporting gold, converted into Canadian funds at the average of the buying rates of exchange of that country reported to the Department of Finance by the Bank of Canada at 11 a.m. daily during the week in which the gold is deposited with the Mint or Assay Office.

In addition to newly-mined Canadian gold there may be accepted at the Mint gold (over 1 ounce troy—fine) in the following forms: old jewellery and dental scrap, provided it has not been melted or otherwise treated in any way to prevent its origin being readily recognized; scrap from manufacturers and refiners the result of processes carried out by them in the ordinary course of their business; gold coin which when of full weight and fineness, is not legal tender in Canada. Satisfactory evidence as to the origin of the gold shall be furnished by the depositor if required.

Delivery of deposits shall be accepted at the Mint counter only, free of all charges, and when bullion is forwarded by mail or express the original packages will not ordinarily be opened until an invoice of the description and weight of their several contents has been received. When there is a serious discrepancy between the actual and invoice weights of any deposit, further action in regard to it will be deferred pending communication with depositor.

The gross value of a deposit shall be calculated at a rate of one dollar for each 23.22 grains fine gold contained therein (equivalent to \$20.6718 † the ounce fine) and at a rate for all silver in excess of one per centum of the weight of the deposit after melting to be determined by the Minister of Finance. The rate to be paid, under Clause 4 of the regulations, for silver in excess of one per centum of the weight of deposits received in any week, shall be one cent below the average for that week of the daily New York quotation for fine silver, from Monday to Friday, inclusive, converted into the equivalent in Canadian funds at the average of the daily rate of exchange between Montreal and New York, calculated to the nearest one-eighth of a cent.

Table 44.—Canadian Gold Stocks, 1925-1939

(Thousands of fine ounces)

December 31	Dominion Notes on Statutory Reserve	Chartered Bank Gold in Canada (1)	Postal Savings Bank Reserve	Free Gold balance of Minister of Finance	Total Gold Stock
1925.....	6,506	3,014	154	9	9,683
1926.....	6,187	3,115	150	9	9,461
1927.....	6,039	3,067	147	138	9,391
1928.....	4,152	2,961	141	221	7,475
1929.....	2,841	2,675	124	82	5,722
1930.....	4,398	2,612	117	140	7,267
1931.....	2,994	2,467	113	133	5,707
1932.....	3,395	2,056	109	29	5,589
1933.....	3,326	1,814	111	44	5,295
1934.....	3,183	1,822	107	285	5,397
	Bank of Canada Gold Reserve				
1935.....	5,158	1	105	136	5,400
1936.....	5,159	2	104	119	5,384
1937.....	5,160	2	106	55	5,323
1938.....	5,283	2	109	93	5,487
1939 (a).....	5,886	2	111	129	6,128

(a) December 30, 1939.

Table 45.—World's Monetary Stocks of Gold at the Close of 1937, 1938 and 1939 (Subject to Revision)

(Compiled by the United States Mint from available data)

(Stated in United States money)

Country	Total Gold Stock Value, 1937 (f)	Per capita	Total Gold Stock Value, 1938 (f)	Per capita	Total Gold Stock Value, 1939 (f)	Per capita
	\$	\$	\$	\$	\$	\$
United States (e).....	12,760,151,000	99.04	14,511,624,000	111.04	17,643,577,000	133.17
Canada.....	183,603,000	16.51	193,088,000	17.23	206,223,000	18.55
Argentina.....	469,421,000	36.78	431,561,000	33.30	466,000,000	36.51
Belgium.....	597,070,000	71.67	728,104,000	86.82	607,140,000	72.85
Denmark.....	53,451,000	14.26	53,366,000	14.07	53,083,000	14.10
France.....	2,566,425,000	61.18	2,430,376,000	57.89	2,708,878,000	64.64
Germany.....	28,491,000	0.42	28,543,000	0.36	40,118,000	0.59
Great Britain.....	3,141,485,000	66.43	2,696,043,000	56.78	10,314,000	0.22
Italy.....	210,253,000	4.87	192,885,000	4.43	144,000,000	3.29
Netherlands.....	929,542,000	107.45	994,525,000	113.96	690,128,000	79.92
Norway.....	81,764,000	28.12	93,598,000	32.04	93,916,000	32.31
Poland.....	82,611,000	2.39	84,541,000	2.41	85,000,000	2.46
Portugal.....	68,653,000	9.40	68,758,000	9.22	68,900,000	9.47
Roumania.....	120,780,000	6.15	132,791,000	6.69	151,606,000	7.72
Russia (Soviet Union).....	(b)	(b)	(b)	(b)	(b)	(b)
Spain.....	525,000,000	21.13	525,000,000	21.00	525,000,000	21.13
Sweden.....	244,685,000	38.93	321,119,000	50.89	308,117,000	49.02
Switzerland.....	648,203,000	154.96	699,095,000	166.06	548,580,000	131.43
British India.....	275,014,000	0.74	274,578,000	0.76	274,472,000	0.81
Japan (including Chosen, Taiwan, Kwantung).....	261,390,000	2.56	163,476,000	1.59	163,570,000	1.61
Netherlands East Indies.....	(d) 79,338,000	1.20	79,552,000	1.18	89,930,000	1.40
Egypt.....	54,781,000	3.43	52,229,000	3.26	52,500,000	3.30
Australia.....	3,435,000	0.50	3,435,000	0.50	4,200,000	0.61
New Zealand.....	23,086,000	14.55	23,086,000	14.39	23,086,000	12.04
Union of South Africa.....	194,860,000	19.09	229,357,000	23.19	250,451,000	2.13
Other countries.....	718,611,000	.....	746,510,000	.....	724,292,000	.....
Total.....	24,322,103,000	(c) 11.75	25,757,240,000	(c) 12.46	25,933,051,000	(c) 12.71

(b) Russian data omitted because of indefiniteness or unavailability.

(c) Population figures are principally from Yearbook of the League of Nations, 1937-38-39.

(d) January 1, 1938.

(e) Includes Alaska, Hawaii and Puerto Rico.

(f) 1 ounce fine gold \$35.

NOTE.—It is understood that material amounts of gold are not reported by several countries, such as, amounts held in secret funds for stabilizing currencies and those hoarded or held outside of regularly reported stocks.

THE ALLUVIAL GOLD MINING INDUSTRY IN CANADA

At the present time the greater part of the Canadian production of alluvial gold comes from the Yukon Territory and British Columbia; relatively small quantities are also obtained in Alberta, Saskatchewan and Quebec.

It was estimated that 157,270 ounces of crude gold were recovered from Canadian alluvial deposits in 1939. Of this production, 84 ounces came from Saskatchewan, 475 ounces from Alberta 49,746 ounces from British Columbia, and 106,965 ounces from the Yukon.

Quebec.—On the Embergold Mines claims, in Ditton Township, work had not been resumed on June 8, but a new compressed-air hoist had been set up at the shaft. In Beauce, prospecting of alluvial deposits on the Famine and Plants rivers was carried on by Geo. A. Dion. Moe River Gold Mines was organized during the year to work some placer deposits on the Salmon River in Compton Township; work conducted by this Company included trenching, stripping and camp construction. There were no recoveries of gold from Quebec alluvial deposits officially reported during 1939.

New Brunswick.—Free gold was discovered at Taylor's Island on the shore of the Bay of Fundy about four miles west of Saint John city. A small "gold rush" developed in 1939 and the Department of Lands and Mines of New Brunswick was asked to examine the deposits as to their economic possibilities. The gold was discovered on the beach at the foot of a 35 foot gravel cliff, between the levels of high and mid-tide. It is associated with fine-grained black sand and samples were tested in the laboratories of the Mines Branch, Ottawa. It appears that the immediate source of the gold is a 4 inch bed of pleistocene sand at the level of high tide and that it is spread over the beach by wave action. No official reports of commercial production of gold from this deposit were recorded in 1939.

Saskatchewan and Alberta.—"Placer gold has been mined along the North Saskatchewan River at various points between Rocky Mountain House, Alberta, and Prince Albert, Saskatchewan, from about 1860. Most activity has, however, been confined to the Alberta region, particularly in the vicinity of Edmonton."

"The returns of gold from the river for a period of thirty-two years, from 1887 to 1918, are given by the Department of Mines as 15,036 fine ounces valued at \$310,814. These figures were compiled by the Department from reports of local bank managers as a basis. In 1887 the first dredge was built on the river and from that time dredges have worked with varying success, though most of the gold has been obtained by miners working with shovel and grizzly collecting the gold on blankets, after which the blankets are washed and the gold separated from the tailings by means of mercury

"The gold is irregularly distributed in the gravels of the river and under bench gravels . . .". (Department of Natural Resources, Regina, Sask.)

"A grant for placer mining on the bank of the Peace River was again renewed and a new grant and a renewal were issued covering claims on the bank of the Athabaska River. Nine ounces of gold were reported extracted during the year. Two new dredging leases were issued on the McLeod river covering nine and one-half miles. No dredging operations, however, were conducted in the province during the year ending March 31, 1939". (Annual Report, Alberta Department of Lands and Mines).

British Columbia.—It has been found impractical to obtain complete reports for each individual placer gold mining operation in British Columbia in as much as a considerable quantity of the crude placer gold is recovered annually by prospectors of no fixed abode who, in many instances, market their recoveries through local merchants and banks.

In 1939 official returns were made to the Dominion Bureau of Statistics by approximately 89 operators who reported 543 employees and the distribution of \$511,773 in salaries and wages. Consumption of fuel and process supplies amounted to \$75,306. The value of crude gold production was \$1,454,573 compared with \$1,671,015 in 1938.

A decrease in the production of placer gold in British Columbia during 1939 had been anticipated, the Consolidated Gold Alluvials at Wingdam being inoperative with the exception of individuals being allowed to conduct leasing operations on portions of the company ground. In Atlin Mining Division operations were practically normal, and in the Stikine area increased activity was noted, principally on ground held by Boulder Creek Mines Ltd. Messrs. Peter Jorgensen, Jack Wheaton and D. L. Wing also continued operations. Cariboo and Quesnel areas were active and production was about the same in the aggregate. Omineca division and particularly in the Manson Creek area saw a fair production but much work and construction was done with the object of preparing for increased production in the 1939 season.

The Alberni Gold Mining Company is reported to have a program outlined of testing beach sands on sections of the west coast of Vancouver Island. (Philip B. Freeland).

Northwest Territories.—The mining recorder at Fort Smith reported that little activity occurred in placer mining in the Northwest Territories during the year. Twenty-one extensions were granted on placer claims in the Nahanni District.

Yukon (G. A. Jeckell, Controller, Yukon Territory).—The amount of placer gold mined during the year ending March 31, 1940, in the Territory on which Royalty Export Tax was paid was 108,077·89 ounces, produced as follows: Dawson District, 105,980·98 ounces; Mayo District, 1,221 ounces; and Whitehorse District 875·91 ounces. The royalty collected was \$40,529·58. The gold production was 17,483·34 ounces more than for the previous year.

In the Dawson District ninety-six new placer location grants, seventy-seven relocation grants, and two thousand three hundred and twenty-nine renewal grants were issued, representing two thousand five hundred and two claims in good standing. Three dredging leases were renewed covering twenty-three miles, and fees for six renewals of hydraulic leases were paid.

In the Mayo District four new placer location grants, seventeen relocation grants, and eighty-two renewal grants were issued, making one hundred and three placer claims in good standing.

In the Whitehorse District five new placer location grants, three relocation grants and thirty-one renewal grants were issued, making thirty-nine claims in good standing.

The total number of placer claims in good standing for the whole Territory was two thousand six hundred and forty-four.

The Yukon Consolidated Gold Corp'n. Limited maintained in good standing all property previously controlled and acquired a few claims, on which a total of \$20,735.60 was paid to the Government in fees. Hydraulic stripping operations were conducted for the entire season at seven large plants; a total of \$187,865 was expended on stripping operations during the year. Cold water thawing operations were continued at seven plants formerly operated and one new plant for Dredge No. 3 in the Guggieville area. Nine dredges were operated for the entire season and Dredge No. 11 for a short period at the end of the season after its completion. Dredging commenced as early as April 8 and ended at one location as late as January 12. A total of 10,141,189 cubic yards were dredged; 74,272.42 fine ounces of gold and 17,394.63 fine ounces of silver were produced during the year. An average of 387 men were employed and \$1,061,000 were expended for salaries, wages and board. Expenditures for equipment and supplies, not purchased locally, totalled \$469,490, on which freight to Dawson was paid amounting to \$121,000. Local purchases, consisting principally of groceries, gasoline and horse feed amounted to \$185,000. Dredging conditions were favourable until November 10 when a sharp reduction in power supply occurred causing shut down of five dredges immediately.

The Holbrook Dredging Company, in Receivership, operated a dredge on the Upper Sixty-mile River, commencing on May 16 and closing down on November 8, producing 3,024.54 ounces, having a recovery value of \$83,412.62. This dredge is diesel operated and is equipped with fifty-two four-foot buckets, but owing to its age and condition was only able to dig sixty per cent of the total capacity of 2,000 cubic yards. The yardage dug during the 1939 season was approximately 200,000 cubic yards. An average of twenty-one men were employed and the wages paid amounted to \$37,551.03.

On the Upper part and on the Left Fork of Clear Creek the Canadian Placers, Limited, continued their exploration for resources for a large scale placer operation. They met with such success that mining equipment has been ordered, and this will be installed on the Left Fork of Clear Creek as early as possible, resulting in production during 1940.

Individual mining operations chiefly during the summer season were confined to the old placer Creeks in the Dawson and Sixtymile areas, Haggart and Highet Creeks in the Mayo area, and Bullion and Burwash Creeks in the Kluane Lake area, and Livingstone Creek District. No placer discoveries of consequence were made during the year, but prospecting for placer gold has been on the increase.

Table 46.—Summary Statistics of Alluvial Gold Mining in Canada, 1938 and 1939

	1938			1939		
	(d) British Columbia	(e) Yukon	(a) (f) Quebec, Saskatchewan and Alberta	(d) British Columbia	(e) Yukon	(a) (f) Quebec, Saskatchewan and Alberta
Number of firms and individual operators†...	103	4	5	89	6	(g) 2
Capital employed.....\$	5,045,001	7,781,435	20,537	2,098,507	7,746,017	(c)
Number of employees.....	588	471	12	361	465	(g) 4
Salaries and wages paid.....\$	857,229	1,194,046	5,661	511,773	926,560	(g) 1,432
Electricity generated for own use.....K.W.H.	1,579,119	29,949,900	.....	1,346,927	30,218,700	.....
Electricity generated for sale.....K.W.H.	59,221	3,506,023	.....	26,057	3,562,100	.....
Crude gold recovered.....crude ounces	57,759	89,129	517	49,746	106,965	559
Platinum recovered.....ounces	23	.....	.....	25	.....	.....
Value of platinum recovered.....\$	812	.....	.....	840	.....	.....
Quantity of material handled.....cu. yards	4,138,746	8,870,628	(c)	4,779,407	11,152,198	2,300
Length of ditches (b).....miles	139	48	.....	129	72	.....
Total gross value of alluvial products.....\$	1,661,961	2,364,592	14,869	1,455,413	3,051,829	16,345
Fuel and electricity used (purchased).....\$	57,414	77,252	407	44,771	74,921	.....
Process supplies used.....\$	60,922	52,037	590	30,535	60,075	(c)
Cost of freight and express on dust, nuggets, bullion, etc., shipped.....\$	3,549	8,537	.....	2,487	33,050	(c)
Cost of smelter, refinery and mint treatment on material shipped.....\$	10,589	17,073	.....	5,271	67,503	(c)
Total net value of Alluvial products.....\$	1,529,487	2,209,693	13,872	1,372,349	2,816,280	16,345

(†) In addition to the number shown in the table, there were numerous small operators from whom returns were not obtainable; subject to revision.

(a) Recoveries for Alberta and Saskatchewan represent receipts of crude gold from Alberta and Saskatchewan at the Royal Canadian Mint, Ottawa, and the Dominion Assay Office, Vancouver, B.C. No other statistics available.

(b) Includes flume; in use.

(c) Information not available.

(d) Value of crude gold in Canadian funds in 1938 was estimated to be \$28.76 per crude ounce. In 1939 it was \$29.24.

(e) Value of crude gold in Canadian funds in 1938 was estimated to be \$26.53 per crude ounce. In 1939 it was \$28.53.

(f) Value of crude gold in Canadian funds in 1938 was estimated to be \$28.76 per crude ounce. In 1939 it was \$29.24.

(g) Quebec only—data not available for Alberta and Saskatchewan.

THE AURIFEROUS QUARTZ MINING INDUSTRY IN CANADA

The great part of the gold of Canada comes from the Canadian Shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of MacKenzie River. The area of the shield is roughly 1,825,000 square miles, almost half of Canada. The deposits of the shield are of two main types, namely, quartz veins, from which most of the gold, up to the present time, has been won, and sulphide deposits which produce a smaller but very considerable proportion. The second great source of gold in Canada has been the Western or Cordilleran section, comprising British Columbia and Yukon Territories; the gold production from this section includes relatively large quantities obtained from alluvial deposits. The third principal area in which gold deposits occur is the Acadian region of Eastern Canada, the metal occurring principally in Nova Scotia where it has been mined since 1862.

The number of Canadian gold mining firms reporting mining operations in 1939 totalled 455 compared with 535 in 1938; 80 in 1929 and 65 in 1923. During the year under review there were 474 properties in operation compared with 550 in 1938; in 1939, 232 mines reported production as against 226 in 1938 and 33 in 1923.

The gross value of output for the entire industry and including the value of all recoverable metals, including gold, silver, etc., totalled \$160,014,172 in 1939 compared with \$143,146,911 in 1938. Of the 1939 total, \$109,737,969 were contributed by mines in Ontario, \$24,665,228 by mines in Quebec, and \$18,539,368 by the gold mines of British Columbia.

Employees in the lode gold mining industry totalled 30,622 compared with 29,647 in 1938 and 5,524 in 1923. Salaries and wages paid increased from a total of \$50,462,092 in 1938 to \$53,206,225 in 1939 and fuel and purchased electricity consumed by the industry during 1939 amounted to \$7,952,580 while the cost of explosives, drill steel and other process supplies used in the same period amounted to \$19,484,870.

Dividends paid during 1939, as computed from actual returns made by the lode gold mining industry, totalled \$42,060,008.

Nova Scotia Gold Mining Industry, 1939

(J. P. Messervey, Inspector of Metal Mines and Quarries, N.S. Department of Mines)

Early in the year the Department laid plans for assistance to the gold operators of the province and obtained the services of G. V. Douglas, Professor of Geology at Dalhousie University, for this purpose. Many of the operating mines in the province were visited and examined and assistance given in interpretation of geological problems encountered by the operators. This work formed a basis upon which exploration and development of additional reserves can be undertaken.

The principle established was, that the Department would supply the services of a geologist and, if necessary, a field survey party, to any operator deserving assistance, the operator undertaking to house and board the Department's personnel and supply additional labour, if necessary. This service was asked for and supplied to six developing and operating properties during the year and proved a successful and substantial form of assistance to the development of the mineral wealth of the province.

The Mine Apprentice Project at Chester Basin continued in operation with the training of young men in hardrock mining. With the outbreak of war, a number of trainees left to join the Army and, on instructions from Ottawa, no new trainees have been enrolled. The war situation has definitely changed the Youth's training schemes, throughout Canada, and this project may have to close with the end of the Federal fiscal year, March 31, 1940. That the project has definitely proved its own worth is shown by the records of wages obtained by trainees since they left the school. Incomplete records show that over \$400,000 in wages have already been earned by the 350 youths who have passed through the school.

To rehabilitate coal miners from Thorburn area of Pictou County, the Department of Labour, jointly with the Federal Department of Labour, authorized the establishment of an older age Rehabilitation Project on the gold deposits of Fifteen Mile Stream. Work commenced in July, when Professor Douglas and his field party made preliminary surveys to determine the most feasible way to attack the project. Relief recipients were put on the property in August, to construct buildings for living quarters. A power line has been installed from the Sheet Harbour-Pictou line of the Nova Scotia Power Commission and pumps installed and mine workings unwatered. Mining and mill equipment is now being installed and it is expected that the property will go into operation early in 1940. Forty-one trainees are now on the property.

Seal Harbor Gold Mines Limited, Goldboro, stepped up its mill capacity to 260 tons per day early in the year and the main shaft was sunk from the 400 to the 550 foot level where drifting and crosscutting to the main ore zones was completed before the end of the year.

At Goldenville, the Guysboro Mines Limited completed another year of very successful operations. The original shaft 260 feet from the surface has been deepened by them and levels established at 400, 500 and 600 feet. Construction of new buildings, installation of new electric hoist and treatment plant for auriferous concentrates have been carried out during the year.

The Consolidated Mining & Smelting Company completed another year of successful operations at Caribou Mines. Most of the stoping was confined to the ore above the 500 foot level.

In February the whole plant of the Avon Gold Mines Limited at Oldham was changed over from diesel operation to hydro-electric power. The original mill on the property consisted of 20 stamps. A ball mill, jig, classifier and blanket unit of 75 tons were added during the summer months. Underground developments were pushed extensively and the main winze from the 450 foot level was deepened to the 675 foot level. During the winter months of 1940 they plan to sink this winze to 925 feet thus establishing two additional levels.

One gold mine was forced to close during the year, and prior to its final closing the field party surveyed, examined and sampled the existing limits of the workings, so that definite knowledge is available on file in the Department, if at some future time it is decided to reopen the property.

The value of the production in 1938 was \$1,000,000. This exceeded that of the former peak year 1898 by \$400,000. Due to the closing of one mine, the value of the production for 1939 is about the same as that of last year. There are today seventeen gold mining enterprises in Nova Scotia of which ten are contributing to the production of gold. Several other properties are under investigation.

New Brunswick

(N.B. Department of Lands and Mines)

At Alcida, Gloucester County, the Youth Training Party No. 9 located and trenched several gold-bearing veins which gave encouraging assays at the surface, but the values diminished rapidly below the zone of oxidation.

On the Monquart River in Carleton County five claims were staked where encouraging zones of sulphides had been discovered. Samples assayed 0.06 ounces of gold per ton. No commercial production of gold was reported in New Brunswick during the year under review.

The Gold Industry in Quebec in 1939

(A. O. Dufresne, Director, Quebec Bureau of Mines)

With a gold production (shipments) of 951,681 ounces, valued at \$34,394,703 in 1939, the Province of Quebec easily retains the second place among the provinces of the Dominion. This ranking as a gold producer was reached in 1931 and has been held continuously since that year.

The entirety of this gold was produced by Western Quebec mines, in the contiguous counties of Temiscamingue and Abitibi. Returns of production in 1939 were received from 29 mines; of these mines, four were new producers: the Amm Gold, the Central Cadillac, the Wood Cadillac and the Mooshla. The output of the first three, situated in Cadillac township was bullion, while the Mooshla, in Bousquet township, produced high grade ore which was sent to the Noranda smelter.

The gold industry of Quebec expanded remarkably in the last 12 years, since the discovery of the deposits of the Rouyn-Harricana region. These are of two types: "straight gold ores", in which the precious metal is found in quartz gangue, and "complex sulphide ore bodies" in which the gold occurs in large replacement lenses of iron, copper and zinc sulphides, from which copper and zinc are also produced. The gold-quartz ores are treated by amalgamation and cyanidation and the sulphides are smelting ores.

In 1939 approximately 72 per cent of the gold production was derived from the gold-quartz ores, and 28 per cent from the complex sulphide ores.

Prospecting activities rather fell off in 1939, the number of claims recorded totalled 8,781, against 11,320 in 1938 and 18,641 in 1937. The latter number constituted a record of all times.

The gold quartz mines had a very good year and continued to expand. Out of the 18 principal producers, 15 reported an increase in the production of bullion, as compared with 1938, and the decreases of the three others were very slight.

In the western part of the Rouyn-Harricana region, the Francoeur mill was increased and a cyaniding unit was added to it. The Arntfield maintained a steady production, with the bulk of the ore treated in the mill coming from No. 2 shaft area. At the Powell-Rouyn the shaft was deepened to 1,650 feet and the production was speeded up to 850 tons a day; this company has no mill, the ore is trucked to the Noranda smelter where it is used as a silicious flux, as well as for its gold tenor. The Stadacona Rouyn Mines, Limited encountered financial difficulties in the fall of 1939, and a liquidator was appointed. Nevertheless the mine and mill were operated continuously all year, at 450 tons a day during the first half, and at 350 for the last months. The Beattie mine and mill continued to operate on a basis of 1,700 tons a day. At the McWatters mine encouraging results have been obtained by the development work carried out on the lower levels.

In the Bousquet-Cadillac area, the Mooshla mine was reopened, and shipments of high-grade gold ore were commenced to the Noranda custom smelter. The O'Brien mine produced an average tonnage of 170 tons daily; No. 3 shaft was completed to 1,523 feet and a connection was made with No. 2 shaft at the 1,500 foot level. Production was commenced from the Central Cadillac mine, and the Thompson Cadillac mill is utilized for treating the ore. A 200 ton mill was erected at the Wood Cadillac, and production was commenced late in the year. Production was commenced at the Amm mine in March, and at the end of the year the mill was treating 150 tons daily. At Lapa Cadillac, a cyanide unit was added to the mill, and tonnage was stepped up to 250 tons per day.

Important developments took place in the Fourniere-Malartic area. A steady output of 675 tons daily was maintained at the Canadian Malartic mine; a new shaft was completed to a depth of 625 feet on the eastern boundary of the property, and a 2,500 foot drift was driven to connect with the No. 1 shaft workings. A new shaft was also completed at the Sladen Malartic mine, and production was increased to 700 tons daily. At East Malartic, production was increased to 1,500 tons per day; an extensive stripping operation involving the removal of 400,000 cubic yards of overburden from the orebody was nearing completion at the end of the year. The Malartic Goldfields mine was developed and brought into production in record time; shaft-sinking was commenced in February, and by the end of the year three levels had been opened, and a 300 ton mill was in operation.

In the Bourlamaque-Dubuisson area, a steady output of 600 tons daily was maintained at the Siscoe mine. At the Sullivan Consolidated mine, the No. 1 shaft was deepened to 1,150 feet and production was stepped-up to 350 tons daily in the final quarter of the year. An average daily tonnage of 1,200 tons was treated at Lamaque and an inclined internal shaft was completed to a vertical depth of 2,423 feet from the surface.

At Sigma, production averaged 700 tons per day; the shaft was deepened to 1,000 feet below the 8th (1000-foot) level. The Perron No. 5 shaft was completed to a depth of 1,156 feet and production was increased to 365 tons daily. The Cournor mill was in steady operation throughout the year. An amalgamation of the Cournor and Beaufor properties was carried out.

Production at the Belletierre mine, in Guillet township, has been increased to over 200 tons daily, and the mine responded very favourably to development with important additions to ore reserves in the No. 12 zone.

A great deal of exploration and development work was carried out on many gold-quartz deposits in various localities in Western Quebec. The Flordin Mines, Limited did much surface work on their property in the Currie township area. The Mic-Mac Explorations, a subsidiary of the U.S. Smelting, Refining and Mining Company actively explored several properties on which they have secured options, the Cassels-Duval, in Bousquet township, being one of them. The National Malartic carried out an extensive programme of diamond drilling on their two properties in Fourniere and Malartic townships respectively. The Senator Rouyn Mines, Limited has purchased a complete milling plant to be set up early in 1940. The Lake Rose mine, situated in Currie township, 75 miles north of Senneterre closed down on March 18, 1939, owing to depletion it is reported.

Bill No. 35, an Act respecting the sale of unwrought precious metals was introduced into the Legislative Assembly of Quebec in June, 1940. The purpose of this bill is to facilitate the suppressing of the illegal traffic in precious metals by requiring anyone carrying on such commerce to have a license, and by providing for appropriate regulation.

Summary Review of the Ontario Gold Mining Industry 1939

(Maurice Tremblay, Statistician, Ontario Department of Mines)

Porcupine.—Preston East Dome, while a producer in 1938 through shipments of high-grade ore, actually joined the group of producing mines with the commencement of milling operations on February 25, 1939. The new mill at De Santis Porcupine Mines went into production in May, 1939. Broulan entered the production stage, using the Mace mill, on the 1st of November. The first brick was poured on December 2, 1939. One of the pioneer properties of the camp, Mace Gold Mines (formerly Vipond) ceased operating in October. Production started on this property in 1911. Towards the end of the year mill construction was being rushed on the Aunor and Faymar properties. Shaft sinking on both properties was started in April, 1938.

Kirkland Lake.—The No. 2 shaft at Macassa was sunk from the 500 foot to the 2,900 foot elevations. Lowest stoping level at this property is 3,350 feet below ground. Mill capacity at Kirkland Lake Gold Mines Ltd. was increased to 400 tons a day. A new 145 foot steel headframe was erected and the No. 3 winze was sunk 576 feet to the 4,468 foot elevation. At the end of the year the mine was hoisting 300 tons of ore per day. At Teck-Hughes the mill operated throughout the year at approximately 1,000 tons a day. The No. 6 internal shaft at Lake Shore was sunk from 4,000 to 4,700 elevations and the No. 4 internal shaft deepened from 4,450 foot elevation to 5,075 feet. No new levels were established but development was carried out on the lower levels. The No. 5 winze at Wright-Hargreaves had reached a depth of 6,410 feet below the surface. The lowest stoping level at this property is at the 4,900 foot level. At the Sylvanite mine tonnage was slightly increased. Loading pockets were installed at the 3,300 foot level and 2,000 foot level of the main shaft. Preparations were made to sink a new internal shaft to be collared on the 3,150 level. Sub-level development of former margins of old stopes yielded sufficient ore to operate the Toburn mill for the year. Cross-cuts on the 1,100 were put out through Toburn and into Federal ground to obtain structural information. Operations by Toburn were suspended May 30, 1939 at the Continental Kirkland Mines property. The No. 2 winze at Bidgood Kirkland was deepened from 1,525 foot to 2,025 foot level. The No. 1 shaft was reopened in October with construction of new shaft house, headframe, hoist and compressor building, boiler house, water tank and ore bin. Development work was done on three new levels at the Morris Kirkland Gold Mines Ltd. The mill was operated under lease by Upper Canada Gold Mines until early in October. This latter company deepened the shaft on its property and established new levels. A new 150 ton mill was operating since October, 1939. Crescent Kirkland was reopened in July. Drifting some 450 feet to the S.W. on the 3rd level was being planned. Golden Gate operated throughout the year and new stopes were opened on the 600 foot level.

Larder Lake.—The mill capacity at Kerr-Addison mine was increased from 700 tons to 1,200 tons per day and a new modern fireproof dry to accommodate up to 350 men was built. The main shaft was sunk from the 700 foot level to a point 125 feet below the 1,450 foot level. Chesterville, north of Kerr-Addison, commenced milling 500 tons per day in July. The shaft was

deepened to 590 feet. At the Cheminis property the shaft was deepened to 550 feet and at the Omega property new levels were established after the Crown shaft had been deepened. Anoki Gold Mines Limited closed down on February 25, 1939, but reopened December 15, 1939 under new management. The shaft at this property was completed to the 475 foot level. Development work on the 500 foot level was done on the property of Beaverhouse Lake Gold mines after operations had been resumed on April 8, 1939. Underground operations were then suspended on September 15. Operations were also suspended at Raven River, Fernland, Barber Larder and Martin Bird during the year.

Sudbury-Timagami-Shiningtree.—Operations at Lebel Oro ceased in October and the mining and milling plant were salvaged, while at the New Golden Rose property the mine and mill were operated all year. Stopping was continued on the same levels as in 1938. The 200 ton mill at the Tyrinite mine started production on June 15. Operations ceased at the Tionaga, Ronda and Pirate mines. Construction of a mining plant was completed in April at the Jerome property. A shaft was sunk to a depth of 520 feet and levels established at 200, 350 and 500 feet on which lateral work was carried on for the balance of the year.

Matachewan.—Production was maintained by Young Davidson and Matachewan Consolidated. At the Arbade property dewatering of the shaft was commenced in October. It was then planned to do 400 feet of crosscutting on the 200 foot level. Other properties were inactive.

Algoma.—All work at the Agawa mine ceased in October and the amalgamation mill which had been tuned in in April was moved to another property in Porcupine. The Cline mine continued mining and milling throughout the year. Operations were discontinued at the Minto in July and at the Ranson mine in November. Algoma Summit which had ceased producing in February, 1939, was taken over by Magino Gold Mines in September. Engineering work was done for the balance of the year. In the Oba area operations were suspended at the Shenango and Hiawatha properties.

Thunder Bay.—Theresa Gold Mines, Ltd. which was on the list of producers for 1938 confined its activities in 1939 to a small amount of shaft-sinking and surface exploration. The property was inactive at the end of the year. Jellicoe Consolidated Gold Mines Limited was succeeded by Jellicoe Mines (1939), Limited, and commenced mining operations in the middle of August. The ore was treated in the mill of Magnet Consolidated Mines (1936) Limited. A flotation-amalgamation mill of 110 tons daily capacity was erected in May at the latter mine and production was inaugurated in June. Plans were under way to add a cyanide unit to the mill so that shipment of concentrates to the Empire mine for cyanidation could be discontinued. The remaining ten properties in production in 1938 continued throughout 1939 with some increases in tonnage and output. Employment by producing mines jumped from 1,440 in 1938 to 1,643 in 1939 while wage-earners at non-producing mines declined from 157 in 1938 to only 65 in 1939. There were 12 producing mines in 1939 compared to 11 in 1938 and in 1937. There was less prospecting and development work on non-producing properties than in 1938.

Rainy River.—There were no mining operations carried on in Rainy River during 1939 in regard to gold.

Lake of the Woods Area.—About 100 tons of gold ore were treated by the Kenopo Mining and Milling Company, which was incorporated as a private company late in 1938. The above tonnage was taken from the High Lake claim but no gold was recovered. The mill is available for customs milling and during 1939 about 300 tons were milled. It has a capacity of 25 tons daily and the gold is recovered by amalgamation. Kenricia Gold Mines Ltd. joined the list of gold producers on July 1 with a new 100-ton all cyanide mill. The ore was obtained from three stopes, two on the first level and one on the second. Late in the year arrangements were made to treat 10,000 tons of ore from the Sunbeam Kirkland mine, which is situated some 30 miles west in Manitoba. Split Lake Gold Mines Ltd. shipped 150 tons of gold ore to the Kenopo mill at Norman during July and August. This ore was obtained from the surface. Operations were closed down in mid September. Wendigo operated throughout the year treating about 100 tons daily. The bulk of the gold is recovered by amalgamation but a copper gold concentrate is made from the tailings by flotation. The concentrates are bagged and shipped to a smelter.

Upper Manitou and Lower Manitou Lakes Area.—Straw Lake Beach Gold Mines Ltd. joined the group of gold producers late in 1938 and during 1939 an average of 60 tons were treated daily. Mining operations were suspended on December 10 and the mill was shut down on the 16th. Elora Gold Mines Ltd. did not operate underground but did some surface mining from the open cut on the Jubilee vein near the shaft. The ore was trucked to the old Laurentian mill which had been repaired and operated in 1937. Operations were carried on from June 1 when the mill was reconditioned, until September 30 when car conditions made it advisable to suspend operations. Thirty-six tons were treated daily.

Sachigo Area.—Sachigo River Exploration Co., Ltd. operated throughout 1939 and the mill averaged 30 tons of sorted ore daily. The shaft was deepened 285 feet below the 500 foot level to 815 feet and two new levels were opened up at 650 and 800 feet. The mine operated only one shift and sinking was done on the others.

Favourable Lake Area.—The Berens River Mine, which has been idle since January 15, 1938, turned its mill over in September, 1939. Supplies and equipment for the buildings and installation of a mining plant and a 225 ton cyanide mill were assembled and transported by scow to Berens River Landing on Lake Winnipeg in the Fall of 1938 to be hauled to the mine during the winter over a 190 mile tractor route, 75 miles of which is over lakes. Late in the Fall of 1938 some 36,000 pounds of materials were flown to the mine and mill construction commenced to be ready to install the equipment and machinery as it arrived with the tractor freight. The tractors started from Berens River Landing early in January of 1939 and 2,500 tons of supplies, materials and equipment were delivered to the mine before break-up by 10 diesel tractors. The ore at this property is lead-zinc carrying gold and silver. Only gold and silver are recovered by cyanidation although a lead-zinc concentrate is made and stored to be shipped as return freight on the winter tractor trains.

Red Lake Area.—Cochenour Willans Gold Mines Ltd. which has been idle since 1937, entered the production stage in December, 1939. Underground and other preparatory operations had been resumed in January, 1939 and arrangements were made with the Gold Eagle Gold Mines Ltd. to mill about 5,000 tons of Cochenour ore as a test. The test milling was intermittent and ended on April 17. The shaft was deepened during September and October and a new level was established at 375 feet. Mill equipment was delivered to the mine before freeze-up. The 150 ton plant went into operation on November 29. Faulkenham Lake Gold Mines Ltd. continued working at the Starrett-Olsen property until April 15. The option was cancelled and the property and equipment reverted to the Val D'Or Mineral Holdings. Operations at the Gold Eagle mine were continuous during the year and the mill averaged 135 tons per day. Ore from the Cochenour Willans property was treated. Hasaga Gold Mines Ltd. was also active right through the year sending about 150 tons of ore daily by truck to the Red Lake Gold Shore mill. Operations were restricted to the No. 1 workings only. Early in the summer, Hasaga took over the financing and operation of the Starratt-Olsen property formerly operated by Faulkenham Lake Gold Mines. Development started on the 175-foot level and continued until the end of the year. Mill heads were running slightly under \$2.00 at the remote Howey mine, making it the lowest cost producer of Ontario. The costs averaged roughly \$1.25 per ton. Work was carried on intermittently at the Lake Rowan property until September 11 when war conditions made it advisable to close down entirely. Madsen Red Lake Gold Mines Ltd. operated throughout the year and an average of 375 tons were milled daily. Exploration and diamond drilling on the 500 foot level proved up the ore body below the 500 foot level and shaft sinking got underway September 21. Cross-cutting on the 650 foot level just got started at the year end. Some underground work was done at the McMarmac Red Lake Gold Mines Ltd. The company was formed to develop the property of the Margaret Red Lake Gold Mines and the Richmac Gold Mines (1936) Ltd. in Dome township. The property lies about a mile east of the Cochenour Willans shaft. The shaft was completed to the 300 foot level at the end of the year. McKenzie Red Lake Gold Mines Ltd. operated their property throughout the year, and milled at the rate of 193 tons per day. The inclined winze was deepened below the 850 foot level and three new levels were established. McKenzie took options on the Sanshaw and Margaret properties. Diamond drilling was done on the Sanshaw property during the Spring. Shaft sinking and development were carried out at the Margaret property.

Woman and Uchi Lakes Area.—At Hanalda Gold Mines Ltd., which was formed to take over the property held by Kenalda Gold Mines Ltd., north of the Uchi, a three compartment vertical shaft was sunk to a depth of 323 feet with levels established at 150 and 300 feet. Development followed on both levels. Jald Gold Mines Ltd. is the company formed to operate the property of the Conwo Gold Mines Ltd. situated 2 miles north of the Uchi mine shaft. By December 11 the vertical shaft was completed to 323 feet and development followed on two levels established at 150 and 300 feet. J. M. Consolidated operated all year, the mill treating an average of 100 tons daily. Uchi Gold Mines Ltd. entered the production stage fifty days ahead of schedule on May 4. The plant, a 500-ton cyanide mill treated an average of 422 tons daily during the year. Much underground development work was done.

Birch and Casummit Lake Area.—Jason Mines Ltd. was formed to assume the liabilities and take over the operation of the former Argosy Gold Mines Ltd. Shaft sinking on what is known as the No. 1 vein was commenced in January and levels were established.

Pickle Crow Area.—Dewatering at the Albany River Gold Mines Ltd. was commenced on November 8 and on December 1 a cage was installed and development was inaugurated on the 625 foot level on December 17. Central Patricia Gold Mines Ltd. at the No. 1 operation operated all year and the mill treated an average of 315 tons daily including 30 tons of sorted ore from the No. 2 operation. The No. 1 shaft was deepened and new levels were established. Mining was done chiefly below the 375 down to the 1,000 level. A new all steel headframe and a sorting plant were erected in August. The shaft at the No. 2 operations was deepened also and new levels were established. Some 30 tons of sorted ore are trucked to the No. 1 mill daily. At the Pickle Crow property operations were carried on through the year and the mill treated an average of 350 tons of sorted ore daily. A new all-steel headframe was erected in September and a new hoist, capable of operating to 3,000 feet was installed and in operation by the first of November. Exploration work was done on the 750 level from a 1,200 foot cross-cut driven to the north of the workings to explore a possible ore body outlined by diamond drilling from surface. Drifting was directed to the east towards the Albany River property (subject to revision).

MANITOBA GOLD MINING INDUSTRY, 1939

(Geo. E. Cole, Director of Mines, Manitoba)

The production of gold in Manitoba during 1939 totalled 180,875 ounces as compared with 185,708 ounces for 1938.

Gold was produced at six gold-quartz mines, two of which, Gurney and Laguna, discontinued operations towards the end of the year. Gold was also obtained in the treatment of base metal ores of the Flin Flon and Sherritt Gordon mines. The year's gold production of all mines is but 4,439 ounces under that of 1938.

Developments at God's Lake during the year proved to be very satisfactory and permitted not only of maintaining the daily production at 200 tons but of increasing the value of production. Development work was concentrated on lower horizons and two important ore shoots were explored. Towards the end of the year preparations were made for the sinking of a new shaft to a depth of 2,000 feet at a point 6,000 feet west of No. 1 or Main shaft.

In the southeastern part of the province the San Antonio mine enjoyed the best year of its history producing some 34, 237 ounces of gold and at the same time increasing its ore reserves.

The Gunnar mine maintained an output of 145 tons a day and produced 18,193 ounces of gold, and ore reserves were maintained. The company deepened its main shaft to the 1,750-foot level and prepared for development at three new levels.

During the year 1939 dividends were continued by both the San Antonio and Gunnar companies while God's Lake Gold Mines Ltd. paid its first dividend at October first.

While production of gold has been maintained in keeping with 1938 there was some improvement in the prospecting situation. Interesting discoveries were made at Last Hope Lake situated some 106 miles northeast of Sherritt-Gordon mine before the declaration of war in Europe. It is difficult to foretell what bearing the international situation will have on the gold prospecting during 1940. Geological work was continued by the Dominion and the Province during 1939.

An innovation in prospecting was attempted in Manitoba when the province undertook the training of a number of young men under the Dominion-Provincial Youth Training Scheme. Sixty youths were given a preliminary prospector's training course in Winnipeg and in July were placed under canvas in the West Hawk-Falcon Lake area and in The Pas area. Field training lasted three months during which they were given a thorough insight into the routine of prospecting in Precambrian country. At the end of this period, some 75 per cent of those trained were considered to be worthy of recommendation to mining companies or others desirous of securing persons competent for prospecting ventures.

Saskatchewan's Gold Mining Industry, 1939

(E. Swain, Supervisor of Mines)

Gold production in Saskatchewan reached 77,120 ounces, a peak in its metal-mining history.

This advance is the result of higher grade ore from the Hudson Bay Mining and Smelting Co. property near Flin Flon, the entry of the Consolidated Mining and Smelting Company Box Property at Lake Athabaska as a producer, and 64.229 ounces of placer gold from the North Saskatchewan River.

In addition, ore tonnage at Flin Flon was stepped up from 4,500 tons to about 5,200 daily during the latter part of the year. The Company is making notable progress in sinking its second main operating shaft.

Consolidated Mining and Smelting Company commenced operating about July 1 putting through 1,200 tons of ore daily and deriving its energy from a 3,300 H.P. hydro electric plant situated at Wellington Lake some 24 miles distant in a Northwesterly direction. The site is capable of doubling its output of electrical energy, which would require the addition of another unit of equal power.

Athona Mines (1937) Limited, whose mine is located near Goldfields, awaited completion of the "Box Mill" before deciding on future activity. It is expected that the Company will shortly decide the steps to be taken to place its mine on a producing basis. The question of obtaining power is of paramount importance.

The Churchill River Power Company, a subsidiary of the Hudson Bay Mining and Smelting Company, has added another 19,000 H.P. unit to its Island Falls plant which has brought its capacity up to 90,000 H.P. It has also constructed regulatory dams to conserve the necessary head of water to maintain the required output of energy.

Flin Flon Gold Mines Ltd. property at Douglas Lake which is about 4 miles South West of Flin Flon remained idle. The property was recently taken over by Douglas Lake Mines Ltd. and a 10,000 foot diamond drilling program has been planned in an endeavor to locate further ore reserves.

The Sulphide Lake area near Lac La Ronge continues to attract attention as to its possibilities. Much surface work was done in the district by a few groups of men. A reliable company has secured options on a large number of mineral claims and has embarked upon a geophysical survey which may be completed during 1940. Some gold was panned from the gossan on the S & O No. 1 mineral claim by Adolph Studer who had a long ton in operation but it is not known whether he made wages with this effort. The mining road from Prince Albert to Lac La Ronge has reached a point at about 50 miles from the village the balance of the road has been cut and slashed and may be completed this year.

British Columbia Gold Mining Industry, 1939

(Philip B. Freeland, Chief Mining Engineer)

The Polaris-Taku Mining Company Ltd., Tulsequah River, in the Atlin Mining Division, continued operations and milled 68,968 tons of ore, the concentrates produced being shipped to Tacoma smelter.

The Big Missouri continued operations, the underground mill treating 202,321 tons of ore. Silbak Premier Mines Ltd., milled 169,164 tons of ore. The Surf Inlet Consolidated Gold Mines Ltd., in the Skeena Mining Division milled 27,264 tons of ore and the concentrates were shipped to Tacoma.

Porcher Island Mines, Ltd., operated for a short period during the year, and later went into voluntary liquidation.

A new mine in the Stikine area, came into production during the year, the property being operated by the McDames Lake Mining Co. Ltd. on McDames Lake. A small production was made and plans made to increase same in 1940.

In the Cariboo District, the Cariboo Gold Quartz Mining Co. Ltd. milled a total of 110,208 tons of ore. Island Mountain Mining Co. Ltd. milled 46,209 tons during the year. The Cariboo Hudson carried on operations and production for a part of the year, the mill closing down in July pending financial adjustments.

In the Omineca Division, the Quesnelle Quartz Mining Co. Ltd. operated for a short time in the early part of the year and then went into voluntary liquidation.

In the Kamloops area the Windpass was worked by lessees during a part of the season. In the Similkameen and Osoyoos divisions, the Cauty Gold made a small production, and the main production was made by Hedley Mascot, Kelowna Exploration, Osoyoos Mines of Canada, Ltd., and Fairview Amalgamated. Other producers were Gold Standard, Grandora, Monashee, Empire, MacSicar, Silver King, Smuggler and Yellow Valley.

Grand Forks, Greenwood Division, had a number of properties shipping during the year. Among these were the Athelstan, Berlin, City of Paris, Inland Empire, Little Bertha, Winnipeg and Yankee Boy. The Union mine near Grand Forks and formerly owned by the late J. F. McCarthy, was taken over by W. E. McArthur of Greenwood, and shipments were made during 1939.

Other shippers in the area were the Amandy, Beaver, Brooklyn-Stemwinder, Granby (Phoenix) North Star, No. 7, and Providence.

In the Nelson area the main producers were Arlington (Oscarson), Gold Belt, Kootenay Belle, Relief Arlington, Reno, Sheep Greek, and Ymir Yankee Girl. The Bayonne came back into production. In the Ainsworth division, the Highland-Surprise and the L. H. made tonnage shipments. The Midway in Fort Steele and the Winslow Syndicate made small productions.

In the Trail Creek division, a number of leasers made shipments from the properties owned by the Consolidated Mining and Smelting Co. In addition, the Midnight operated by B. A. Lins had a successful year, and other shippers were the Albion, Cariboo Evening Star, I. X. L., Midnight and O. K.

The Vidette mine near Ashcroft continued to operate, as did the Ashloo near Squamish.

In the Lillooet division, the Bralorne maintained its position as leading gold producer of the Province and during the year milled 184,922 tons. The Pioneer milled 88,009 tons, but production was curtailed owing to labour difficulties, from early October, 1939, until about the middle of March, 1940. The mine is now back on practically capacity production. The Minto is expected to resume shipments early in 1940 under leasing arrangements. A new producer the Jagee made a small production.

The Alberni division saw resumption of production at the Havilah, and the United Prospectors (controlled by Privateer Mines, Ltd.) again made shipments from the Thistle mine.

The Vancouver Island Gold Mines Ltd., in voluntary liquidation, leased its property to Mr. G. Moffatt, Port Alberni.

The Zeballos area, Clayoquot Mining Division was responsible for making a substantial contribution to the Provincial output of gold. The Privateer is the major operation, having milled 26,820 tons during the year. The Spud Valley Gold Mines Ltd., also made an excellent showing and is credited with 20,950 tons milled. The Mount Zeballos Gold Mines Ltd. milled 6,337 tons, the new mill turning over in August. Central Zeballos Gold Mines, Ltd., controlled by Reno Gold Mines, Ltd., contributed a small output in 1939.

In the Nanaimo Mining Division development proceeded at the properties controlled and operated by Loughborough Gold Mines, Ltd., and leasing operations at the Alexandria were carried on for a short period during the year. Several properties in the Yale (now New Westminster) division recorded small tonnage shipments.

Gold Mining in Northwest Territories, 1939

(C. S. Lord, Geological Survey, Department of Mines and Resources)

In 1939 Northwest Territories completed its second year of steady lode gold production and nearly all gold came from Con and Negus mines on Yellowknife Bay on the north arm of Great Slave Lake. Most prospecting was done in the Yellowknife Bay area, in the adjacent Beaulieu River area, and near Wray Lake 120 miles north-northwest of Yellowknife Bay. It is estimated that these areas were prospected by 125 men during the summer of 1939 compared with 350 men during the summer of 1938. About 1,400 claims were recorded from these areas in 1939 compared with about 3,500 claims in 1938. Many new gold deposits were found in 1939 and nearly all of them are in areas mapped by the Geological Survey. River transportation between Waterways and Yellowknife was facilitated by improvements of river channels and docks and the first over-land winter freight to reach Yellowknife arrived there in the spring of 1939 by tractor train over a road from Grimshaw, Alberta. Plans for the construction of a 4,700 horsepower hydro-electric plant near Yellowknife Bay were announced by Consolidated Mining and Smelting Company of Canada, Limited, early in 1940.

Yellowknife Bay.—Con mine, operated by Consolidated Mining and Smelting Company of Canada, Limited, started production in September, 1938, and by the end of 1939, 53,000 tons of ore had been milled and about 40,500 fine ounces of gold recovered. During August, 1939, the mill treated 3,306 tons of ore containing 1.00 ounce of gold a ton. Ore reserves at the end of 1939 were 53,720 tons containing 0.86 ounce of gold a ton. Nearly all ore treated came from two veins and from above the 250-foot level. Lateral workings from a vertical shaft total more than 7,500 feet and are on 125-, 250-, and 500-foot levels. The shaft is reported to have been extended below the 500-foot level during the winter of 1939-40. On the 250-foot level 1,200 feet of drifting on one vein exposed 648 feet of ore in six shoots which averaged about 5½ feet wide and contained about 1.3 ounces of gold a ton; one of these shoots is 100 feet long, averages 17 feet wide, and contains 1.00 ounces of gold a ton. The process used at the 110-ton mill is a combination of amalgamation and cyanidation.

A little ore from Rycon mine, 2,200 feet east of Con mine, was treated at the Con mill.

Negus mine started production in February, 1939, and by the end of the year 18,996 tons of ore had been treated and 15,995 fine ounces of gold recovered. This ore came from five veins. Ore reserves at December 31, 1939, were 12,900 tons containing 11,428 ounces of gold and most of this ore was below the 100-foot level. Lateral workings from a vertical shaft totalled about 4,400 feet at the end of the year and are on the 100-, 200-, and 300-foot levels. The process used at the 60-ton mill is a combination of amalgamation and cyanidation.

Ptarmigan Mines, Limited, controlled by Consolidated Mining and Smelting Company of Canada, Limited, continued underground work on a wide quartz vein, part of which is of ore grade. By March, 1940, the vertical shaft was 600 feet deep and the vein explored by drifts on 150-, 300-, and 450-foot levels. Drifts on the 150- and 300-foot levels totalled about 1,200 feet in August, 1939. The company was reported to be considering the erection of a 130-ton mill.

Giant Yellowknife Gold Mines, Limited, completed more than 5,400 feet of diamond drilling on the Brock veins and Ole shear zone. An inclined prospect shaft was sunk to a vertical depth of 55 feet on the Brock veins and 192 feet of drifting completed. Seventy-four tons of selected ore, containing 647 fine ounces of gold, were shipped to Trail, B.C.

Beaulieu River area is a 4,400-square mile rectangle lying immediately east of Yellowknife Bay. Most gold discoveries in Northwest Territories in 1938 and 1939 were made in this area.

Thompson-Lundmark Gold Mines, Limited, continued underground work on the Kim vein and started underground work on the Fraser vein which was perhaps the outstanding gold discovery made in Northwest Territories in 1939. Kim vein dips 50 degrees and drifts at vertical depths of 115 and 230 feet totalled 1,202 feet when work on the vein stopped in August, 1939. It is estimated that 27,230 tons of material containing 0.40 ounces of gold a ton ("cut") would be available from this vein for milling. Fraser vein dips 47 degrees and to March, 1940 drifts at vertical depths of 115 and 230 feet totalled 712 feet. An ore shoot in this vein averages 313 feet long and 2.3 feet wide and it is estimated that 18,600 tons containing 0.83 ounces of gold a ton ("cut") would be available from this vein for milling. The company is considering the advisability of erecting a mill. Electric power would probably be available near Yellowknife Bay, about 28 miles to the west.

No work was done at the property of Camlaren Mines, Limited in 1939 and some machinery was removed from the property. Previous underground work to a depth of 350 feet indicated 13,177 tons of material containing 0.62 ounces of gold a ton ("cut").

About twenty men were employed for four months by Dome Mines, Limited, on the S.D.C. group near Pensive Lake. Surface sampling in 1938 indicated an average gold content of 0.24 ounces a ton throughout a quartz body 225 feet long and 23 feet wide but further work failed to locate ore and work was stopped in July, 1939.

A two-ton mill was operated from August to December by Harry A. Ingraham Trust near Pensive Lake. Spectacular gold ore from a quartz stringer was treated and about 20 ounces of gold were recovered during the first month of operation.

No other properties in Beaulieu River area had advanced beyond the early prospect stage by the end of 1939.

Great Slave Lake.—The property of Slave Lake Gold Mines, Limited on Outpost Islands remained idle but is reported to have been sampled with the purpose of locating tungsten ore.

Wray Lake.—About 840 claims were recorded from this district and most of them were staked before midsummer. Very little prospecting was done here in the late summer. About 1,600 pounds of spectacular gold ore from the Ann group was shipped by airplane to Yellowknife for treatment.

The following information was supplied by the Mining Recorder, Fort Smith, N.W.T.:—

"The population in the Yellowknife area during the summer of 1939 would approximate 1,400, decreasing to 1,000 during the winter . . . Sub-mining recorders are located at Edmonton, Alberta and Yellowknife, Simpson, Aklavik and Coppermine in the Northwest Territories in addition to the mining recorder's offices at Fort Smith and Port Radium . . . Aeroplane transportation was maintained by the MacKenzie Air Service, Limited, the Canadian Airways, Limited, and Peace River Airways. The winter landing field at Wrigley has been improved, also Fort Smith, Resolution and Fitzgerald. Improvements at Yellowknife settlement undertaken by the Government last summer include roads and the installation of a water system for the residents of Yellowknife."

Yukon

(G. A. Jeckell, Controller, Yukon Territory)

During the twelve months ending March 31, 1940 there were fifty-one quartz grants issued in the Dawson District and two hundred and twenty-eight claims were renewed.

In the Mount Free Gold District, Mr. T. C. Richards continued operations on the LaForma mine under the name of Carmocks Exploration. A road was constructed during August and September 1939 from a point on the Overland road Whitehorse to Dawson, to the LaForma mine on Mount Free Gold. Production for the year amounted to 1,147 ounces of gold.

Table 47.—Principal Statistics of the Auriferous Quartz Mining Industry in Canada for 1939

	Number of active operators	(b) Number of operating plants or mines	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	(a) Cost of process supplies used	Value of freight paid on shipments of ore, slag, etc.	Smelter and refinery -treatment costs	Gross value of bullion, ore, concen- trates or residues shipped from mines (c)	Net value of bullion, ore, concen- trates or residues shipped from mines (c)
1939—			\$		\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	22	22	1,271,558	517	521,558	85,006	227,748	4,519	4,743	898,445	576,429
Quebec.....	129	135	44,824,611	5,554	8,693,777	1,549,148	3,301,343	96,786	546,746	24,665,228	19,171,205
Ontario.....	157	159	173,034,760	19,717	35,712,152	5,192,624	12,886,950	139,417	1,077,354	109,737,969	90,421,924
Manitoba.....	13	13	4,125,864	729	1,197,647	272,596	342,275	6,461	33,858	3,906,648	3,251,458
Saskatchewan.....	3	3	231,200	179	260,408	49,232	185,284	869	3,461	327,778	88,932
British Columbia.....	119	129	23,322,794	3,660	6,375,245	674,919	2,338,400	417,630	566,693	18,539,368	14,541,776
Northwest Territories.....	11	12	1,865,282	262	440,438	127,155	200,870	7,533	14,457	1,397,460	1,547,445
Yukon.....	1	1	16,500	4	5,000	2,000	2,000	900	2,000	41,276	34,376
Canada.....	455	474	248,692,569	30,622	(d) 53,206,225	7,952,580	19,484,870	694,165	2,249,312	160,014,172	129,633,245

(a) Explosives, chemicals, etc.

(b) Number of mines producing in 1939 was 232.

(c) Value of bullion produced plus value of ore, concentrates, etc. shipped.

(d) Includes \$6,369,380 in salaries.

Table 48.—Principal Statistics Relating to PRODUCERS ONLY in the Auriferous Quartz Mining Industry in Canada, 1939

	Number of producing plants or mines	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	(a) Cost of process used	Value of freight paid on shipments of ore, slag, etc.	(b) Smelter and refinery treatment costs	Gross value of bullion, ore, concen- trates or residues shipped from mines (d)	Net value of bullion, ore, concen- trates or residues shipped from mines (d)
		\$		\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	21	1,234,251	510	517,412	84,579	227,640	4,519	4,743	898,445	576,964
Quebec.....	28	30,661,072	5,014	8,006,657	1,489,653	3,107,751	96,786	546,746	24,665,228	19,424,292
Ontario.....	79	157,786,024	19,054	34,705,613	5,075,350	12,689,750	159,417	1,077,354	109,737,969	90,736,098
Manitoba.....	9	3,785,364	653	1,000,972	240,835	319,958	6,461	33,858	3,906,648	3,305,536
Saskatchewan.....	1	(c)	174	256,917	48,432	185,284	809	3,461	327,778	89,732
British Columbia.....	88	19,702,500	3,400	6,019,321	655,972	2,287,720	417,680	566,663	18,539,368	14,611,303
Northwest Territories.....	5	1,140,378	192	320,028	104,205	181,679	7,533	14,457	1,897,460	1,589,586
Yukon.....	1	16,500	4	5,000	2,000	2,000	900	2,000	41,276	34,376
Canada.....	232	211,324,689	29,001	50,891,920 (e)	7,701,026	19,001,782	694,165	2,219,312	169,014,172	130,367,837

(a) Explosives, etc.

(b) Includes handling charges.

(c) Not recorded separately—included with data relating to non-ferrous smelting industry in British Columbia.

(d) Value of bullion produced plus value of ore, concentrates, etc. shipped.

(e) Includes \$5,861,681 in salaries.

Table 49.—Ores Mined and Milled, Crude Bullion Recovered and Crude Bullion and Concentrates Shipped in the Auriferous Quartz Mining Industry, 1939

	Nova Scotia	Quebec	Ontario	Manitoba	Saskat- chewan	British Columbia	North- west Territories	Canada*
Number of producing mines.....	21	28	79	9	1	88	5	232
Ore mined..... tons	195,457	3,699,380	11,143,082	349,657	179,985	1,473,506	63,785	17,105,744
Material discarded (sorted)..... tons	27,500	157,812	382,572	28,891		62,303	1,500	660,578
Ore milled..... tons	172,695	3,274,046	10,715,954	320,767	179,985	1,423,300	62,534	16,150,173
Tailings retreated..... tons		2,766	3,900			11,760		18,426
Concentrates produced..... tons	678	5,831	31,421			43,352		81,327
Gold content of ores, slags, resi- dues and concentrates ship- ped—								
To Foreign smelters..... fine oz.			6,556			140,516		147,687
To Canadian smelters..... fine oz.		46,022	8,353	107		20,593	730	75,805
Bullion bars shipped—								
Gold content..... fine oz.	24,421	632,734	2,970,266	69,671	8,555	315,197	50,041	4,070,885
Silver content..... fine oz.	725	130,253	507,491	39,401	2,245	79,910	11,720	771,745
Bullion produced by amalgama- tion..... crude oz.	25,990	144,104	391,882	44,255		144,813	11,328	762,962
Bullion produced by cyanida- tion..... crude oz.	1,177	767,219	3,846,600	131,591	10,801	298,053	59,825	5,115,266
Total Bullion Produced..... crude oz.	27,167	911,323	4,238,482	175,846	10,801	442,866	71,153	5,878,228
Content of bullion bars produced—								
Gold..... fine oz.	24,776	634,564	2,996,399	106,800	8,555	337,588	51,139	4,160,352
Silver..... fine oz.	743	130,454	514,490	43,569	2,246	87,922	11,966	791,440
Value (standard)..... \$	512,451	13,171,088	62,147,357	2,225,518	177,763	7,014,529	1,060,426	86,320,129
Exchange premium on bullion bars produced..... \$	385,994	9,802,850	46,937,384	1,677,264	150,015	5,249,923	810,565	65,022,134
Value of ores, concentrates, slags and residues sold..... \$		1,691,290	653,228	3,866		6,274,916	26,469	8,671,909
Total Gross Value of Produc- tion..... \$	898,445	24,665,228	109,737,969	3,906,648	327,778	18,539,368	1,897,460	160,014,172
Value of fuel, electricity and pro- cess supplies used also freight on shipments, marketing, smel- ter and refining charges*..... \$	322,016	5,494,023	19,316,345	655,190	238,846	3,997,592	350,015	30,380,927
Net Value of Production.... \$	576,429	19,171,205	90,421,624	3,251,458	88,932	14,541,776	1,547,445	129,633,245

* Includes partially complete data for one property in Yukon.

Table 50.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1939

	Ontario mines shipping		Quebec, Manitoba, Northwest Territories and Yukon mines shipping		British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
Number of mines.....	17	2	13	1	50	33	116
Tons of ore, etc., shipped.....	6,168	696	260,858	45	13,184	42,877	323,828
Metal content—							
Gold..... oz.	8,353	6,556	46,859	615	20,593	140,516	223,492
Silver..... oz.	12,900	172,784	829	250	99,328	1,042,177	1,328,268
Copper..... lb.	12,123	235,903			987	607,259	856,272
Lead..... lb.					1,768,648	894,777	2,663,425
Antimony..... lb.							
Value—Gross..... \$	311,231	341,997	1,721,625	22,140	767,210	5,507,706	8,671,909

(a) Some gold ores exported contain relatively large quantities of lead which are not reported by the producer; this lead is reported by the U.S. Smelters and 50 per cent is credited to Canadian lead production.

(b) Any antimony recovered from Canadian ores in Canadian smelters is not usually reported by mine operators.

Table 51.—Specified Costs per Ton of Ore Milled at Certain of the Principal Auriferous Quartz Mines in Canada, 1939

Name of Mine	Develop- ment and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
	\$	\$	\$	\$	\$
NOVA SCOTIA					
Avon Gold Mines Ltd.....	2.01	3.48	1.67	2.03	9.19
Guysborough Mines Ltd.....	1.762	1.797	0.683	1.060	5.302
Seal Harbour Gold Mines Ltd.....	0.366	1.087	0.510	0.489	2.452
QUEBEC					
Amm Gold Mines Ltd.....	0.137	2.242	1.074	0.522	3.975
Arntfield Gold Mines Ltd.....	0.215	1.840	0.753	0.579	3.387
Beattie Gold Mines Ltd.....	0.296	0.651	1.022	0.317	2.286
Belleville Quebec Mines Ltd.....	1.503	3.389	1.573	0.202	6.667
Canadian Malartic Gold Mines Ltd.....	0.667	0.860	0.638	0.594	2.759
Francoeur Gold Mines Ltd.....	0.47	1.30	1.25	1.17	4.19
Lake Rose Mines Ltd.....	.....	8.09	8.11	3.05	19.28 (d)
Lamaque Mining Co. Ltd.....	1.57	2.12	0.65	1.42	5.76
Lapa Cadillac Gold Mines Ltd.....	0.206	1.769	1.100	0.526	3.600
McWatters Gold Mines Ltd.....	2.83	2.50	1.83	1.21	8.37
O'Brien Gold Mines Ltd.....	1.92	3.22	1.79	1.53	8.46 (e)
Perron Gold Mines Ltd.....	1.681	2.930	0.843	1.007	6.466
Sigma Mines Ltd.....	1.006	2.101	0.605	0.356	4.068
Siscoe Gold Mines Ltd.....	0.8576	2.0262	0.9190	0.7136	4.5164
Sladen-Malartic Mines Ltd.....	0.617	1.186	0.747	0.512	3.062
ONTARIO					
Porcupine District					
Buffalo Ankerite Gold Mines Ltd.....	0.468	2.818	0.805	0.495	4.586
De Santis Porcupine Mines Ltd.....	1.51	2.45	1.18	0.57	5.71 (f)
Dome Mines Ltd.....	0.99	1.55	1.07	2.11	5.72
Hollinger Consolidated Gold Mines Ltd. (Timmins).....	0.9631	2.6944	0.6560	1.4042	5.7177
Hollinger Consolidated Gold Mines Ltd. (Ross).....	1.3869	1.7351	1.5266	1.0888	5.7374
Mace Gold Mines Ltd.....	0.010	3.045	1.412	0.230	4.697
McIntyre Porcupine Mines Ltd.....	0.644	3.583	0.774	0.983	5.984
Pamour Porcupine Mines Ltd.....	0.96	1.03	0.49	0.19	2.67
Paymaster Consolidated Mines Ltd.....	1.66	2.42	(g)0.83	0.76	5.67
Kirkland Lake District					
Bidgood Kirkland Gold Mines Ltd.....	2.49	4.41	1.47	0.86	9.23
Golden Gate Mining Co. Ltd.....	2.92	2.34	2.30	1.17	8.73
Kirkland Lake Gold Mining Co. Ltd.....	1.83	3.40	1.21	1.15	7.59 (i)
Macassa Mines Ltd.....	1.53	2.71	1.12	1.69	7.05
Teck-Hughes Mines Ltd.....	(h)	3.70	0.90	1.43	6.03
Wright-Hargreaves Mines Ltd.....	(h)	4.567	1.141	2.804	8.512
Larder Lake District					
Chesterville Larder Lake Gold Mining Co. Ltd.....	0.662	0.534	0.919	1.001	3.116
Kerr-Addison Gold Mines Ltd.....	1.59	1.29	0.83	0.28	3.99
Laguerre Gold Mines Ltd.....	1.06	2.56	1.28	0.78	5.68
Matachewan District					
Hollinger Consolidated Gold Mines Ltd. (Young David- son).....	0.3660	1.3127	0.5728	0.3925	2.6440
Matachewan Consolidated Mines Ltd.....	1.025	1.574	0.824	0.423	3.846
Thunder Bay and Kenora Districts					
Bankfield Consolidated Mines Ltd.....	2.6509	1.6960	1.4898	1.8113	7.6480
Howey Gold Mines Ltd.....	.....	.....	.....	.....	1.255 (j)
Leitch Gold Mines Ltd.....	5.20	5.27	1.88	1.36	13.71
MacLeod-Cockshutt Gold Mines Ltd.....	0.9244	2.0406	1.0546	0.7240	4.7436
Sand River Gold Mining Co. Ltd.....	1.68	6.53	1.55	0.27	10.03
Wendigo Gold Mines Ltd.....	0.98	3.83	1.75	1.21	7.77
Patricia District					
Central Patricia Gold Mines Ltd., No. 1 mine.....	1.35	2.58	1.31	1.04	6.28
Central Patricia Gold Mines Ltd., No. 2 mine.....	10.58	8.36	1.35	1.21	21.50
McKenzie Red Lake Gold Mines Ltd.....	1.164	2.079	1.113	2.582	7.538
Pickle Crow Gold Mines Ltd.....	1.03	2.87	0.99	2.43	7.32
MANITOBA					
God's Lake Gold Mines Ltd.....	1.283	2.473	(k)1.779	1.222	6.757
Laguna Gold Mines Ltd.....	0.02	3.52	2.17	0.84	6.55

Table 51.—Specified Costs per Ton of Ore Milled at Certain of the Principal Auriferous Quartz Mines in Canada, 1939—Concluded

Name of Mine	Develop- ment and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
	\$	\$	\$	\$	\$
NORTHWEST TERRITORIES					
Con Mine†.....		8.45	3.69	0.61	12.75
Rycon Mine†.....		24.27	3.49	2.58	30.34
Negus Mines Ltd.†.....	(1)	(1)	(1)	(1)	17.34
BRITISH COLUMBIA					
Ashloo Gold Mines Ltd.....	2.08	2.63	2.25	5.10	12.06
Bralorne Mines Ltd.....	2.0659	2.8290	0.6780	1.8583	7.4312
Buena Vista Mining Co. Ltd.....	0.25	1.02	0.99	(1)	2.26
Fairview Amalgamated Gold Mines Ltd.....	0.15	1.61	1.34	0.44	3.54
Hedley Mascot Gold Mines Ltd.....		1.67	1.31	4.16	7.14
Island Mountain Mines Co. Ltd.....	2.60	1.96	2.07	2.96	9.59
Livingstone Mining Co. Ltd.....	2.00	4.50	4.00	0.50	11.00 (m)
Osoyoos Mines of Canada Ltd.....	0.529	1.139	1.608	0.656	3.932
Polaris-Taku Mining Co. Ltd.....	1.511	2.648	1.023	1.715	6.897 (m)
Privateer Mine Ltd.....	2.698	4.27	2.69	3.97	13.638
Sheep Creek Gold Mines Ltd.....	1.992	2.972	1.447	0.988	7.399
Ymir Yankee Girl Gold Mines Ltd.....	0.501	4.339	1.508	0.967	7.315

(a) Exclusive of outside exploration.

(b) Marketing, head office, taxes, etc.

(c) Depreciation not included.

(d) Operations ceased March 18th.

(e) Fiscal year ended September 30th.

(f) December.

(g) Includes ore transportation and crushing.

(h) Included under mining.

(i) Not including taxes.

(j) From Company's annual report—total operating costs before depreciation, Dominion and Provincial taxes and preoperating charges.

(k) Includes crushing and conveying.

(l) Not recorded.

(m) Shipped to smelter.

† New operations in remote district.

Table 52.—Certain Data Relating to the Production of Gold by the Entire Auriferous Quartz Mining Industry in Canada, 1928-1939

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter- refinery treatment on ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1928.....	206	1.47	7.45	Information not available 1928 to 1934	Information not available 1928 to 1934	
1929.....	218	1.46	7.18			
1930.....	237	1.25	6.63			
1931 (a).....	250	1.19	6.50			
1932.....	255	1.21	6.31			
1933 (b).....	207	1.36	7.45			
1934 (c).....	154	1.71	9.64			
1935.....	146	1.89	10.48	4.38		16.75
1936.....	137	1.98	11.32	4.46		17.76
1937.....	132	2.10	12.18	4.65	(d) 0.33	19.26
1938.....	150	1.85	10.95	4.53	0.56	17.89
1939.....	157	1.81	10.69	4.45	0.67	17.62

(a) Equalization exchange premiums paid by the Dominion Government to gold miners (Great Britain goes off gold standard.)

(b) United States goes off gold standard.

(c) United States gold dollar reduced in weight from 25.8 to 15 5/21 grains, 0.9 fins.

(d) Not including Mint charges and marketing prior to 1938.

NOTE.—The data contained in the foregoing table have been compiled from reports received from both producing and non-producing (exploring and developing) operators in the auriferous quartz mining industry. This fact should be noted if the information is to be construed or employed as possible criteria for technological or other statistical study. The trends revealed are not to be interpreted as entirely reflecting "cause and effect" in the operation of producing mines only but rather as indices of change in the industry as a whole. For data relating to producers only, see following table.

Table 53.—Certain Data Relating to the Production of Gold by Producers only in the Auriferous Quartz Mining Industry in Canada, 1931 and 1939

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter-refinery treatment of ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1931.....	256	1.19	6.38	(a)	(a)	.....
1939.....	164	1.76	10.25	4.33	0.67	17.01

(a) Data not available.

Table 54.—Gold Content of Bullion, Ores, Concentrates, Etc., Shipped and Ore Milled by Auriferous Quartz Mines in Canada, with Average Price of Gold in Canadian Funds, 1929-1939

Year	Tonnage treated (*)	Gold content fine oz. (†)	Oz. of fine gold per ton	Average price of gold
				\$
1929.....	4,371,143	1,771,526	-41	20.67
1930.....	4,429,906	1,884,791	-43	20.67
1931.....	5,526,379	2,271,278	-41	21.55
1932.....	5,997,492	2,502,327	-42	23.47
1933.....	6,480,164	2,455,365	-38	28.60
1934.....	7,524,803	2,490,513	-33	34.50
1935.....	8,907,610	2,645,659	-30	35.19
1936.....	10,510,750	3,095,427	-29	35.03
1937.....	(a)11,919,965	3,490,170	-29	34.99
1938.....	(a)14,335,377	4,046,679	-28	35.17
1939.....	(a)18,302,009	4,383,844	-24	36.14

(x) Does not include tailings retreated.

(†) Relatively small quantity of gold contained in concentrates, slags, etc., shipped may have originated in ores treated during the previous year; from 1937 represents metal content of total bullion produced plus metal in ores or concentrates shipped to smelters.

(a) Material discarded by sorting not included.

Table 55.—Principal Statistics Relative to All Ontario Gold Mines by Area, * 1939

Camp or District	Number of producers	Ore treated	Total gold recovered	Average ounces per ton recovered	Employees	Salaries and wages paid	Cost of fuel, electricity and process supplies
		Tons	Fine oz.		No.	\$	\$
Porcupine.....	19	5,133,255	1,312,702	-26 *	8,588	15,903,561	7,505,175
Kirkland Lake (b).....	12	2,301,940	941,371	-41	5,031	9,192,857	4,698,044
Larder Lake.....	5	556,390	93,396	-17	823	1,441,235	852,366
Matachewan.....	2	531,503	63,137	-12	642	1,046,464	707,847
Sudbury.....	5	(a) 121,532	26,229	-22	228	401,654	125,945
Algoma.....	5	109,169	24,708	-23	271	443,551	180,803
Thunder Bay.....	12	714,446	242,395	-34	1,707	2,942,849	1,640,388
Rainy River and Kenora.....	5	72,644	19,070	-26	258	431,907	148,457
Patricia.....	13	1,173,139	287,921	-25	2,121	3,842,980	2,198,281
Eastern Ontario.....	1	6,908	379	-05	48	65,094	22,268
Total.....	79	(a)10,729,925	3,011,308	-28	19,717	35,712,152	18,079,574

(a) In addition 3,820 tons of tailings were retreated.

(b) Probably includes data relating to some non-producing properties that eventually will be classified under Larder Lake area.

* Includes data for all active properties.

Table 56.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1939

Province	Mines		Capital employed as represented by:					
			Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
			\$	\$	\$	\$	\$	\$
Nova Scotia.....	22	21	459,182	684,501	47,084	23,172	57,619	1,271,558
Quebec.....	135	28	19,530,938	16,314,183	2,122,944	1,040,725	5,815,821	41,824,611
Ontario.....	159	79	43,786,979	77,291,061	9,118,766	2,440,558	40,397,396	173,034,760
Manitoba.....	13	9	207	2,156,129	462,471	.....	1,507,057	4,125,861
Saskatchewan.....	3	1	200,000	25,700	5,000	.....	500	231,200
British Columbia.....	129	88	5,095,077	7,337,540	1,595,512	1,056,008	8,238,657	23,322,794
Yukon.....	1	1	1,000	10,000	300	200	5,000	16,500
Northwest Territories.....	12	5	1,405,900	215,250	177,161	.....	66,971	1,865,282
Total.....	474	232	70,479,283	104,034,364	13,529,238	4,560,663	56,089,021	248,692,569

Table 57.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada, by Provinces, 1939

Province	Number of employees					Salaries and wages
	On salary	Wage-earners			Total em- ployees	
		Surface	Under- ground	Mill		
						\$
Nova Scotia.....	55	138	276	48	517	521,558
Quebec.....	630	1,575	2,971	378	5,554	8,693,777
Ontario.....	1,452	4,722	12,194	1,349	19,717	35,712,152
Manitoba.....	89	233	348	59	729	1,197,647
Saskatchewan.....	35	70	63	11	179	260,408
British Columbia.....	368	855	2,083	354	3,660	6,375,245
Northwest Territories.....	34	124	89	15	262	440,435
Yukon.....		2	1	1	4	5,000
Canada.....	2,663	7,719	18,025	2,215	30,622	53,206,225

Table 58.—Wage-Earners, by Months, in the Auriferous Quartz Mining Industry, 1939

Month	Surface	Under-ground	Mill	Total
January.....	7,374	17,922	2,106	27,402
February.....	7,188	17,989	2,101	27,278
March.....	7,050	17,801	2,090	26,941
April.....	6,953	17,690	2,124	26,767
May.....	7,446	18,065	2,158	27,669
June.....	7,872	18,107	2,259	28,238
July.....	8,018	18,236	2,283	28,537
August.....	8,213	18,237	2,293	28,743
September.....	8,387	17,917	2,273	28,577
October.....	8,342	18,040	2,239	28,621
November.....	7,915	18,217	2,270	28,402
December.....	7,346	17,946	2,224	27,516

THE COPPER-GOLD-SILVER MINING INDUSTRY

The mining of "copper-gold-silver" ores in Canada during 1939 was confined to the provinces of Quebec, Manitoba, Saskatchewan and British Columbia. It is to be noted that in addition to the copper recovered from ores of this type there is a very large and increasing quantity of the metal obtained in the smelting and refining of the copper-nickel ores mined in the Sudbury area of Ontario; increasing quantities of gold and silver are also being extracted from these copper-nickel ores. General statistics relating to labour, etc., in the nickel-copper industry are not included in this chapter.

Mining operations conducted on Canadian copper-gold-silver deposits during 1939 were reported by 28 firms compared with 37 in 1938. The gross value of crude ore, concentrates, etc., shipped in 1939 from the mines and mills to smelters was estimated at \$51,161,468; the cost of fuel, purchased electricity, process supplies, freight and smelter treatment totalled \$24,978,891 and the net value of shipments was estimated at \$26,182,577.

During the year under review the industry provided employment for 6,083 persons and distributed \$9,920,591 in salaries and wages.

The statistics as herein shown under the copper-gold-silver mining industry refer only to mines and mills and are not inclusive of data pertaining to the operation of smelters and refineries. Statistics relating to the reduction of non-ferrous ores are recorded under the non-ferrous smelting and refining industry.

Quebec (A. O. Dufresne, Director of Quebec Bureau of Mines).—"The gold production of mining companies operating in Western Quebec on complex sulphide ores which also yield base metals, represented approximately 28 per cent of the 1939 production. Five mines contributed to it: the Horne mine, of Noranda Mines, Limited; the Normetal mine, of Normetal Mining Corporation Limited; the Aldermac mine, of Aldermac Copper Corporation, Limited; the Waite mine and the Amulet mine, both operated by the Waite Amulet Mines, Limited. Of these, the Horne mine is the largest gold producer in Quebec, and the third largest in Canada.

"Operations at the Horne mine of Noranda Mines Limited continued at full capacity of mill and smelter without interruption throughout 1939, and the sinking of a new internal shaft was commenced with the 6,000-foot horizon as objective: a pyrite recovery plant was added to the concentrator. The Waite section of Waite Amulet Mines, Limited was in steady production, and two new 1,000-foot shafts were completed at the Amulet section to develop the big, lower "A" orebody. The Aldermac concentrator continued to treat 1,000 tons of ore per day, and the lower part of No. 4 orebody was developed for sub-level mining by vertical diamond drilling. In spite of an inadequate power supply, operations at the Normetal mine were satisfactory, and developments on the new lower levels indicate a very promising future for this property."

Shortly after the declaration of war, Noranda Mines Limited, along with a number of other Canadian producers, entered into an agreement with the Ministry of Supply of His Majesty's Government in the United Kingdom for the supply of approximately 80 per cent of the Company's copper production during the period September 1, 1939 to September 30, 1940, which agreement is renewable at the option of the purchaser for the duration of the war. The price under such agreement is approximately that received by the Company at the time war was declared and delivery is made in Canada. As the Normetal Mining Corporation Limited and Waite Amulet Mines, Limited, made similar agreements with the British Government, copper concentrate from these Companies was, since September 1, treated on a toll basis, while prior to the war all customs concentrate was purchased outright. A similar smelting contract on a toll basis was since entered into with Aldermac Copper Corporation, Limited, and since February 1, 1940, this Company's copper concentrate has been smelted at Noranda.

In the Eastern townships, the Eustis mine, near the city of Sherbrooke, was operated by the Consolidated Copper and Sulphur Company, producing copper concentrate and pyrite concentrate. During the first half of 1939, the work carried out consisted mainly of mining pillars of old stopes on several levels, preparatory to the closing of the mine on November 30. During the period of

1939 operations, 44,957 tons of ore were milled from which were produced 5,155 tons of copper concentrates and 24,643 tons of iron pyrites concentrates. All copper concentrates were shipped to a smelter in the U.S.A. The Eustis mine was first opened in 1865 and was Canada's oldest producing mining property at the time of its closing down.

Manitoba and Saskatchewan.—During 1939 the Hudson Bay Mining and Smelting Company, Limited, mined, from both open pit and underground, a total of 1,721,752 tons of ore and milled 1,721,783 tons averaging, per ton, copper 2.01 per cent; zinc, 4.14 per cent; gold 0.106 ounces; silver, 1.59 ounces. From this tonnage milled and from 47 tons of purchased custom ore (assaying 1.086 ounces gold, 0.13 ounces silver) there were produced 56,577,498 pounds of copper, 77,580,748 pounds of zinc, 135,230 ounces gold, 1,869,955 ounces silver, 140,438 pounds of cadmium and 64,692 pounds of selenium. In addition, the company smelted on toll 61,890 tons of concentrates. The principal development during the year was that carried on in the southern portion of the mine below the 2,210 foot level. This work confirmed previous results that the ore in this area on the 2,500, 2,750 and 3,000 foot levels, as compared with average of the mine as a whole, is higher in grade and fully as wide, and the year's work increased the estimated length from the figure reported in 1938 to approximately 1,000 feet. The Company's production of copper and zinc, after providing for domestic requirements, was contracted to the British Ministry of Supply at prices approximately those prevailing at the outbreak of the war.

Sherritt Gordon Mines Ltd. conducted continuous mining and milling operations throughout 1939. All of the 622,959 tons of ore mined and hoisted during the year came from the West Mine where the bulk of the year's development was carried on. A total of 622,959 tons (dry) of ore was milled containing 2.768 per cent copper, 0.0187 ounces gold per ton and 0.626 ounces of silver per ton. Concentrates were shipped to Hudson Bay Mining & Smelting Company's Flin Flon smelter. Sherritt Gordon Mines Ltd. reported its production in 1939 at 31,281,982 pounds of copper; 7,386 ounces of gold and 256,342 ounces of silver. Ore reserves of the Company as at December 31, 1939, were reported as follows: 4,860,000 tons containing 2.38 per cent copper 2.81 per cent zinc; 0.017 ounces gold per ton and 0.57 ounces of silver. In common with other Empire copper producers, the Company, after the outbreak of the war, entered into an agreement with the British Government under which approximately 76 per cent of the Company's normal production is sold to the Ministry of Supply at a fair price. The balance of production is sold in Canada.

British Columbia.—The Granby Consolidated Mining, Smelting and Power Company operated the Copper Mountain mine at capacity. A total of 1,451,491 tons of ore was milled, giving a total of 33,416,870 pounds of copper, 12,310 ounces of gold and 242,115 ounces of silver produced. The Company is giving thought and study to the possible construction of smelter facilities.

In the Phoenix area concentrates from 17,960 tons of ore from the Brooklyn and Granby mines were shipped to Tacoma.

From the Rossland properties of the Consolidated Mining and Smelting Company, leasers shipped 9,434 tons of ore. On Surf Inlet the mine and mill of Surf Inlet Consolidated Gold Mines Ltd. were reported as being in continuous operation during 1939; 27,264 tons of ore were milled and 2,759 tons of copper concentrates shipped to a United States smelter.

The Britannia Mining and Smelting Company operated at capacity, milled 2,112,784 tons of ore. The Annual Report of the Howe Sound Company reported on Britannia operations as follows:

"The milling rate was maintained on the same level as in 1938, and the improvements made during that year in modernizing the plant were reflected in better metallurgical results. While exploration work was pressed in all sections of the properties, the principal concentration of effort was on the main, 4,100 foot adit, level and the workings adjacent thereto. A very considerable footage was driven, supplemented by diamond drilling. An interesting mineralized zone of commercial importance has been outlined on the horizon of the 4,100 foot level but headings on other horizons were not completed during the year. Production from the orebody containing somewhat more than normal gold content continued throughout the year and contributed materially to the profitable results obtained from the operation." (Philip B. Freeland)

Table 59.—Capital Employed in the Copper-Gold Silver Mining Industry in Canada, 1939 (a)

Province	Mines		Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
			\$	\$	\$	\$	\$	\$
Quebec.....	17	5	1,186,566	7,772,607	520,325	222,381	7,093,216	16,795,095
Manitoba.....	2	2	4,674,846	7,362,155	1,079,395	986,285	7,959,118	22,061,799
Saskatchewan....	1	1	2,337,423	2,765,920	423,202	43,142	3,466,000	9,035,687
British Columbia*	10	8	300,154	3,732,085	904,367	287,475	5,750,958	10,975,039
Total.....	30	16	8,498,989	21,632,767	2,927,289	1,539,283	24,269,292	58,867,620

* Reports from small leasers shipping from deposits of the Cons. M. & S. Co. of Can. Ltd., in the Rossland district, are compiled as one producer; statistics relating to employment, etc., at these properties are not available.

(a) Not including smelters and refineries.

Table 60.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, by Provinces, 1939*

Province	Number of employees					Salaries and wages
	On salary	Wage-earners			Total employees	
		Surface	Under ground	Mill		
						\$
Quebec.....	114	494	1,293	236	2,137	3,438,348
Manitoba.....	140	500	592	131	1,363	2,484,660
Saskatchewan.....	55	187	140	49	431	771,801
British Columbia.....	187	582	1,050	333	2,152	3,225,782
Canada.....	496	1,763	3,075	749	6,083	9,920,591

* Not including smelters and refineries.

Table 61.—Wage-Earners, by Months, in the Copper-Gold-Silver Mining Industry in Canada, 1939*

Month	Surface	Under-ground	Mill	Total
January.....	1,527	3,042	710	5,279
February.....	1,523	3,084	700	5,307
March.....	1,517	3,060	713	5,290
April.....	1,655	3,090	744	5,489
May.....	1,789	3,088	775	5,652
June.....	1,841	3,008	776	5,625
July.....	1,932	3,012	783	5,727
August.....	1,892	2,989	802	5,683
September.....	1,925	3,012	774	5,711
October.....	1,921	3,070	753	5,744
November.....	1,848	3,222	735	5,805
December.....	1,774	3,191	714	5,679
Average.....	1,763	3,075	749	5,587

* Smelter employees not included.

Table 62.—Shipments from Copper-Gold-Silver Mines of Canada, 1939

—	Quantity	Value	Total metal content as determined by settlement assay				
			Gold	Silver	Copper	Sulphur	Zinc
1939	tons	\$	fine oz.	fine oz.	pounds	tons	pounds
8 mines shipped to Canadian plants (b)—							
Ores.....	868,328	11,753,766	173,019	440,393	60,333,576		
†Copper concentrates.....	616,071	22,871,809	237,742	2,637,965	145,937,499		(c) 1,683,442
Zinc concentrates.....	96,817	2,775,000	7,378	182,517	1,320,610		91,116,593
Iron pyrites concentrates.....	2,436	8,147				1,216	
Slags, residues and gold precipitates.....	595	964,761	24,140	133,330	557,781		
10 mines shipped to foreign plants—							
Ores.....	108	3,599	101	55	5,425		
Copper concentrates (g).....	177,884	11,101,121	53,866	543,600	84,062,126		
Zinc concentrates.....	30,693	752,583			203,969		33,669,569
Iron pyrites concentrates.....	225,200	930,682				113,231	
Total (f).....	2,018,132	51,161,468	496,246	3,937,860	292,420,986	114,447	126,469,604
Value of process supplies, etc.(e).....		24,978,891					
Net Value.....		26,182,577					

† Includes some cyanide precipitate and slags.

(b) Certain mines operated in the Rossland area by leasers are treated, statistically, as one mine.

(c) Not necessarily recovered.

(e) Includes freight on ore shipments, smelter charges and fuel and purchased electricity.

(f) Gross value.

(g) One producer reported only net metal contents of shipments.

Table 63.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1939

—	Manitoba and Saskatchewan	Quebec	British Columbia	Canada
	tons	tons	tons	tons
Ore mined.....	2,409,262	2,456,633	3,608,960	8,474,855
Ore milled.....	2,344,742	1,813,719	3,602,264	7,760,725
Copper concentrates produced.....	406,113	275,083	147,767	828,963
Copper precipitates produced.....			824	824
Pyrite concentrates produced.....		91,262	69,976	161,238
Zinc concentrates produced.....	96,804	9,038		105,842

NOTE.—In addition some cyanide precipitate is produced in the recovery of gold from copper-gold ores; this is smelted in the production of blister or anode copper; also the Manitoba-Saskatchewan boundary passes through the Flin Flon mine.

CHAPTER III

THE SILVER MINING INDUSTRY IN CANADA

(a) The Silver-Cobalt Mining Industry; (b) The Silver-Lead-Zinc Mining Industry.

Definition of the Industry.—Silver Mining in Canada is not a distinct mining industry in as much as silver or silver-bearing minerals usually occur in association with other metals of economic value—with lead and zinc; with cobalt, nickel and arsenic; with lode and placer free gold; in copper-gold and nickel-copper ores, and at Great Bear Lake, Northwest Territories with uranium and radium. Silver-lead-zinc mining is a very important industry in British Columbia and, to a lesser extent, in the Yukon Territory. In Eastern Canada, ores containing lead and zinc have been mined in Ontario, Quebec and Nova Scotia.

It is to be noted that, in addition to its recovery from silver-lead ores, zinc is now produced in large quantities from the copper-gold-silver ores of the Flin Flon mine, a property located on the Manitoba-Saskatchewan boundary. Zinc concentrates have been produced in British Columbia from copper-gold-silver ores by the Britannia Mining and Smelting Co. Ltd.; the metal also occurs with copper-gold-silver ores in Quebec and commercial shipments of zinc concentrates made from these particular ores have been made yearly since 1937.

Statistical data contained in this chapter are essentially those pertaining to the mining of silver-cobalt and silver-lead-zinc ores and, to a lesser extent, silver-pitchblende ores.

(a) The Silver-Cobalt Mining Industry

The mining of silver-cobalt ores in Canada is confined to the district of Temiskaming in Northern Ontario. Veins containing these metals were discovered at or near the present town of Cobalt in 1903 and shipments of ores from this area have been continuous since 1904. Depletion and exhaustion of ore reserves during recent years have resulted in a relatively great decline in the production of metals from these deposits. During the past few years the greater part of the output of silver-cobalt ores in Northern Ontario has originated in the Miller-Lake O'Brien mine, Gowganda, and the O'Brien mine, Cobalt. In most instances, operations at other properties, some of which were prominent as producers in the past, were conducted by lessees and shipments ranged from one to several hundred tons. The increased demand for cobalt as an alloying metal has, for some years, stimulated operations of a salvage nature at several of the older mines.

The Ontario Department of Mines referred to the industry early in 1940 as follows:—

"Stimulated by the demands of the war, the silver-cobalt industry received a new lease on life in 1939, and cobalt, the alloy metal, was the most sought of the several minerals occurring in the complex ores of Cobalt, Gowganda, and South Lorrain. In 1938 production was reported from 35 properties only. In 1939, returns were received covering the output of ores from more than 50 properties.

"Shipments of ore and concentrates from Cobalt in 1939 over the T. and N.O. railway totalled 2,368.44 tons, as against 1,975.62 tons in 1938. The shipments were made up of 947.39 tons of silver ore and 1,421.05 tons of cobalt ore. The destinations of these shipments were: the Deloro Smelting and Refining Company at Deloro, Ontario; Consolidated Mining and Smelting Company at Tadanac, B.C.; the Noranda Mines at Noranda, Quebec, in Canada; and J. A. Samuels, New York; Shepherd Chemical Company, Norwood, Ohio; Philip Brothers, New York; Frankel Brothers, Ltd., Detroit; and Smith Brokerage, New York, in the United States.

"In the fall of the year the O'Brien interests stopped operations at their two mines, the O'Brien at Cobalt and the Miller Lake O'Brien at Gowganda. Operation of the O'Brien mine ceased officially on January 13, 1940, and on the 16th of the same month it was announced that four employees of the mine had leased the Cross Lake workings of the old O'Brien mine from their former employers.

"In an effort to find additional cobalt-bearing deposits, the Minister of Mines, Honourable Paul Leduc, has directed the Provincial Geologist to have a re-examination made of the Cobalt and nearby areas. Geological investigations carried out in the past in these areas were concerned principally with the silver possibilities, cobalt being of little economic value. The situation is now different, and the widespread demand for this metal along with the diminishing known reserves are the reasons which prompted the Minister of Mines to take action. The survey will be carried out in the early summer."

Table 64.—Statistics of the Silver-Cobalt Mines and Mill Operations in Canada, 1937-1939

	1937	1938	1939
Number of mines in operation*.....	25	30	43
Ore mined..... tons	56,878	59,408	60,431
Ore treated (milled) (a)..... tons	61,290	55,719	79,164
Tailings treated..... tons			145
Concentrates produced..... tons	1,435	1,258	2,334
Gross value of bullion, ore, concentrates and residues sold..... \$	853,386	734,363	890,128
Cost of freight..... \$	29,202	(b) 41,391	19,054
Smelter charges..... \$	76,833	(b) 82,783	49,056
Cost of fuel and purchased electricity used..... \$	90,134	(b) 73,549	63,486
Cost of process supplies used..... \$	116,455	248,347	105,500
Net value of sales..... \$	540,762	288,293	653,032

* All mines located in Northern Ontario and includes properties on which the operations consisted only in salvaging of ore from dumps, etc.

(a) Does not include crude ore shipped.

(b) Partly estimated, as data were unobtainable from several small shippers.

Table 65.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1939

	\$
Present cash value of the land (excluding minerals).....	2,541
Present value of buildings, fixtures, machinery, tools and other equipment.....	221,439
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	63,295
Inventory value of finished products on hand.....	
Operating capital (cash, bills and accounts, receivable, prepaid expenses, etc.).....	2,174,281
Total.....	2,461,556

Table 66.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1939

	Number	Salaries and wages
		\$
SALARIED EMPLOYEES—		
Total.....	45	75,730
WAGE-EARNERS—		
Surface.....	103	336,998
Underground.....	129	
Mill.....	46	
Total.....	278	336,998
Grand Total.....	323	412,728

Table 67.—Number of Wage-Earners on Payroll or Time Record on the 15th of Each Month, or Nearest Representative Date, in the Silver-Cobalt Mining Industry, 1926 and 1939

Month	1926	1939			Total 1939
		Mine		Mill	
		Surface	Under- ground		
January.....	1,496	89	159	48	296
February.....	1,456	83	151	47	281
March.....	1,501	80	152	49	281
April.....	1,478	94	152	47	293
May.....	1,480	107	147	58	312
June.....	1,490	141	150	58	349
July.....	1,501	135	132	58	325
August.....	1,533	141	122	45	308
September.....	1,592	111	115	42	268
October.....	1,560	102	91	40	233
November.....	1,478	73	89	28	190
December.....	1,426	64	89	27	180

(b) The Silver-Lead-Zinc Mining Industry

In 1939 the silver-lead-zinc mining industry of Canada reported 82 operators or firms as being actively engaged in the mining, prospecting or development of silver-lead-zinc deposits and of these operators 68 reported commercial shipments during the year under review.

Nova Scotia.—Production of silver-lead-zinc ores in Nova Scotia in 1939 represented only shipments of copper-lead and zinc concentrates made from stock accumulated at the Stirling mine during previous mining operations. The Stirling mine is now inactive and milling ceased February, 13th, 1938.

New Brunswick.—The New Brunswick Department of Lands and Mines reported that several lead and zinc bearing deposits were examined at Elmtree and Quispamsis. No further work was done on the largest known deposit which was drilled by the Tetagouche Exploration Company in 1938.

At Elmtree in Gloucester county, four diamond drill holes totalling 1,111 feet were sunk but the results of the drilling are not available. At Quispamsis mineralization appears to be of two types: ore consisting of galena, sphalerite and pyrite replacing limestone, the other made up of granite replaced by pyrite along joint planes. Sampling of these deposits was discouraging and no further work was undertaken. During 1939 some surveying was conducted at the Teahan mine located at New Ireland in Albert county; this deposit contains galena, sphalerite, chalcopyrite and pyrite.

Quebec.—Some prospecting and trenching of lead-zinc deposits occurring in the Grand Cascapedia district of Gaspé and Bonaventure counties were reported in 1939. No shipments or underground work were recorded. Only pumping and ordinary maintenance operations were reported from the Tetreault mine, at Montauban les Mines; no ore was mined, milled or shipped.

At Calumet Island in the Ottawa River, Calumet Mines Ltd. actively pursued the exploration of its property by intensive diamond drilling. It is reported that favourable results have attended the drilling and that closely spaced holes have indicated the presence of over one million tons of ore with average tenor; zinc, 8·9 per cent; lead, 2·8 per cent; gold, 0·43 ounces, and silver slightly more than 5·0 ounces per ton.

Ontario.—Some development work was conducted at the Lennox mine located near Enterprise in the county of Lennox and Addington. Approximately fifty tons of ore were mined but no commercial shipments were reported.

In Deroche township, Algoma district, surface mining operations were reported by the Algoma Galena Co. A sample shipment consisting of sixty-two tons of crude silver-lead ore was made to a smelter in New Jersey, U.S.A.

British Columbia.—The quantity of silver-lead-zinc ores mined in British Columbia in 1939 totalled 2,108,340 short tons, or 96 per cent of the total tonnage of such ores mined in the entire Dominion. The gross value of shipments of these ores during 1939 amounted to \$15,614,015 and the net value of same was estimated at \$12,275,715. The industry in British Columbia provided employment to 1,356 persons and distributed \$2,103,882 in salaries and wages.

While silver-lead ores are rather widely distributed over certain districts of the province, the major production has originated for several years in the great Sullivan mine of the Consolidated Mining and Smelting Company of Canada Ltd. Many of the smaller properties are operated under lease by a relatively small number of miners or prospectors; ore shipments from such properties are usually consigned to the Trail smelter or to metallurgical plants located in the northwestern part of the United States.

The following information is from the 1939 annual report of the Consolidated Mining and Smelting Company of Canada Ltd.:—"Costs per ton of ore mined at the Sullivan were up slightly over 1938 due chiefly to the lower tonnage mined, holiday payments and a much higher silicosis assessment. The grade of ore mined was somewhat higher than in 1938 . . . ore development has kept well ahead of production. Despite the 10 per cent curtailment in common with other large lead producers, the tonnage smelted was an all-time record due to smelting a charge of lower lead content. Operations in the zinc plant were very satisfactory and several new records were made. An antimony reduction plant was built to work up an accumulation of antimony-arsenic flue dust and the development of an improved process on a semi-commercial scale for the production of magnesium was successfully concluded.

"Compared with 1938, sales and deliveries of our various products showed large increases in both tonnage and dollar value—\$35,000,000 against \$28,000,000. . . . The production of the Consolidated Mining and Smelting Company of Canada Ltd. in lead and zinc alone is greater now than the entire tonnage of all base metals refined in the British Empire in 1914. All of this zinc and most of the lead not required for Canada is taken by the British Government. . . . There was little change from the previous year in Canadian sales of fertilizer products, the volume as usual being largely controlled by the purchasing power of the Prairie farmers. Sulphur sales also showed an improvement over past years and present conditions point to a continuation of the demand. As usual, our silver commanded a ready sale and was disposed of mostly in the United States. There was a stronger demand for bismuth during 1939 but cadmium and antimony were not so active."

Yukon.—In the Mayo district, Wernecke mines were operated continuously throughout 1939 by the Treadwell Yukon Corporation Limited; ore treated in the 150 ton mill of the company totalled 54,294 short tons and 6,451 tons of lead concentrates were produced. Concentrates together with some crude lead ore were shipped to the Bunker Hill smelter, Bradley, Idaho, U.S.A.

Northwest Territories.—Eldorado Gold Mines Ltd. reported that in 1939 there were 33,373 tons of ore sent to the mill and 1,057 tons of concentrates produced having an estimated gross value of \$2,391,325. It was stated that ore reserves at the mine were maintained throughout the year and are now ample for the operation of the present mill for the next four years. Shipments received from the mine at the radium refinery located in Port Hope, Ontario amounted to 522 tons of pitchblende concentrates. Silver-copper concentrates were also shipped from the mine to a smelter in the United States.

Table 68.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry* in Canada, 1939

	Yukon and Northwest Territories	British Columbia (b)	Canada
	Tons	Tons (a)	Tons
Ore mined.....	86,748	2,108,390	2,195,138
Ore milled.....	94,278	2,091,964	2,186,242
Concentrates produced—Lead.....	6,451	260,771	267,222
Zinc.....		219,637	219,637
Pitchblende-silver.....	1,042		1,042
Silver and silver-copper.....	16		16

(*) Includes silver-pitchblende ores mined in Northwest Territories.

(a) Includes data relating to 1 property in Ontario.

(b) No ore mined or milled in Quebec and Nova Scotia in 1939.

Table 69.—Destination of Shipments from Silver-Lead-Zinc Mines of Canada, 1939

	Tons Shipped	Value at shipping point	Total metal content as determined by settlement assay			
			Gold fine oz.	Silver fine oz.	Lead pounds	Zinc pounds
		\$				
To Canadian smelters—						
Lead ore.....	8,442	455,524	557	914,868	1,142,053	224,041
Lead concentrates (a).....	253,922	11,785,446	802	7,060,903	354,645,593	19,151,082
Zinc concentrates (*).....	254,988	3,962,225	1	560,863	16,653,058	256,944,312
Dry ore.....	4,853	179,864	1,735	294,889	52,985	53,769
Total.....	522,205	16,383,059	3,095	8,531,523	372,493,639	276,373,204
To Foreign smelters—						
Lead ore.....	792	181,370	74	441,310	673,542	.....
Lead concentrates.....	13,158	1,446,029	2,825	3,628,720	9,947,252	1,226,668
Silver concentrates (b).....	99	30,349	.....	66,610	.....	.....
Zinc concentrates (*).....	15,905	214,044	.....	11,035	298,466	16,405,898
Dry ore.....	.....	.....	.....	.....	.....	.....
Total.....	29,954	1,871,792	2,899	4,147,675	10,919,260	17,632,476
Grand Total (gross).....	552,159	18,254,851	5,994	12,979,198	383,412,949	294,005,680
Cost of freight.....	.....	1,417,437	.....	.....	.....	.....
Cost of fuel and purchased electricity.....	.....	667,661	.....	.....	.....	.....
Smelter charges.....	.....	994,759	.....	.....	.....	.....
Cost of process supplies.....	.....	1,619,385	.....	.....	.....	.....
Net Value.....	.....	13,555,609	.....	.....	.....	.....

(*) Does not include any zinc concentrates produced from copper-gold-zinc ores in Quebec, Manitoba, Saskatchewan or British Columbia.

(a) Includes shipments of silver-pitchblende concentrates from Northwest Territories. Information relating to content of pitchblende is not available for publication.

(b) Recovered from pitchblende silver ores; in 1939 they contained 43,372 pounds of copper.

NOTE.—In addition to the metals contained in shipments listed in this table there are important quantities of lead and silver contained in ores shipped from certain gold mines in British Columbia. Cadmium, bismuth, antimony and sulphur are also recovered from these ores (silver-lead-zinc).

Table 70.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1939

Province	Present cash value of land, excluding minerals	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$	\$
Ontario, Quebec, Yukon and N.W.T.*.....	219,080	824,431	555,788	215,684	662,717	2,477,700
British Columbia.....	10,507,141	9,134,850	1,235,008	.....	309,921	21,186,920
Canada.....	10,726,221	9,959,281	1,790,796	215,684	972,638	23,664,620

* Includes data relating to silver and silver-pitchblende mines in the Northwest Territories. No capital data reported for Nova Scotia and New Brunswick.

Table 71.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1939

Province	On salary	Mine		Mill	Total	Salaries and wages
		Surface	Under-ground			
British Columbia.....	232	286	564	274	1,356	\$ 2,103,882
Ontario, Quebec, Yukon, and N.W.T.†.....	39	105	120	26	290	699,175
Canada.....	271	391	684	300	1,646	2,803,057

† Includes data on silver-pitchblende mining operations in the Northwest Territories; also one property in New Brunswick.

Table 72.—Number of Wage-Earners, by Months, in the Silver-Lead-Zinc Mining Industry, 1939

Month	Mine		Mill	Total
	Surface	Under-ground		
January.....	365	721	302	1,388
February.....	347	710	297	1,354
March.....	353	699	297	1,349
April.....	389	692	304	1,385
May.....	404	695	313	1,412
June.....	409	668	304	1,381
July.....	408	661	304	1,373
August.....	419	655	309	1,383
September.....	379	681	297	1,357
October.....	363	678	289	1,330
November.....	319	723	287	1,329
December.....	356	677	287	1,320
Average.....	391	684	300	1,375

ARSENIC

Production of arsenic in Canada during 1939 totalled 1,741,917 pounds valued at \$52,257 compared with 2,175,646 pounds at \$56,538 in the preceding year. During recent years arsenic has been produced only by the Deloro Smelting and Refining Company Limited in its plant located at Deloro, Ontario. It is recovered by this company entirely in the treatment of silver-cobalt ores mined in Northern Ontario. Production figures as published represent the element in the form of arsenious acid or white arsenic.

Commercial production of new arsenic in all forms from Canadian ores since 1885 to the end of 1939 amounted to 67,293 short tons valued at \$6,528,861. The largest annual output occurred in 1918 in which year 3,560 short tons worth \$563,639 were recorded. Arsenic is often a constituent of gold ores and has been commercially recovered from auriferous ores mined in Nova Scotia, Ontario and British Columbia. Arsenical gold ores are now being treated at mines located in Northwestern Quebec and in the Thunder Bay District of Ontario. During 1939 Beattie Gold Mines Ltd., Duparquet, Quebec produced 1,460 short tons of arsenic (As_2O_3) and the O'Brien Gold Mines Ltd., Cadillac township, Quebec, 243 short tons of crude arsenic. No commercial shipments of arsenic were reported by either company during the year under review.

The United States Bureau of Mines reported the distribution of sales of domestic arsenic in the United States during 1938 as follows: Insecticides, 47 per cent; weed killer, 30; wood preservative, 3; glass manufacture, 2; and miscellaneous, 1. Regulations in the United States to protect the consuming public require that foodstuffs not only be free from insects but of poisonous insecticidal residues. The latter requirement has stimulated some substitution of organic insecticides less toxic to man for poisonous arsenicals. Metallic arsenic is used as a metal hardener, as flux and in certain alloys; arsenical compounds are used rather extensively in medicinal preparations. In 1939 white arsenic quotations at New York remained at the low price of 3 cents per pound, carload lots.

Table 73.—Production in Canada, Imports and Exports of Arsenic, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Pounds	\$	Pounds	\$
PRODUCTION (x)—				
White arsenic and arsenic in other forms.....	2,175,646	56,538	1,741,917	52,257
Total.....	2,175,646	56,538	1,741,917	52,257
IMPORTS—				
White arsenic (arsenious oxide).....	201,009	3,854	516,236	7,976
Sulphide of arsenic.....	6,094	408	125	54
Soda, arseniate of, biarseniate and stannate of.....	11,200	2,843	32,054	6,739
Arsenate of lead.....	496,387	41,620	568,344	49,238
Arsenate of lime.....	37,068	3,507	389,557	23,643
Total.....		52,232		87,650
Exports—Arsenic—Total.....	1,378,300	32,590	906,300	26,389

(x) Entirely from Ontario.

Table 74.—Production of Arsenic in Canada, 1930-1939

Year	Arsenic in ore†		White arsenic		Year	Arsenic in ore		White arsenic	
	tons	\$	tons	\$		tons	\$	tons	\$
1930.....	1,011	34,523	1,250	95,004	1935.....			1,279	75,326
1931.....			1,787	135,170	1936.....			683	42,491
1932.....			1,212	98,714	1937.....			695	41,032
1933.....			734	56,534	1938.....			1,087	56,538
1934.....			824	56,412	1939*.....			871	52,257

† Exported.

* In addition arsenic was recovered during 1939 in the treatment of certain Quebec and Ontario gold ores but no commercial shipments were reported.

Table 75.—World Production of Arsenic, 1936-1939

(Long tons)

(Supplied by Imperial Institute)

Producing Country and Description	1936	1937	1938	1939
BRITISH EMPIRE				
United Kingdom—				
White arsenic and arsenic soot.....	153	95	65	(a)
Southern Rhodesia—				
White arsenic.....			19	(a)
Canada (sales)—				
White arsenic.....	610	620	971	778
Australia—				
White arsenic.....	3,691	3,387	3,999	(a)
FOREIGN COUNTRIES				
Belgium (exports)—				
White arsenic.....	2,688	2,991	2,664	3,280
Czecho-Slovakia—				
Antimony ore (As. content).....	53	30	(a)	(a)
France—				
Ore (As. content).....	9,490	3,909	7,689	(a)
White arsenic (As. content).....	7,104	9,073	9,659	(a)
Germany—				
Ore (As. content).....	1,843	(a)	(a)	(a)
Greece—				
White arsenic.....	84	230	76	(a)
Pyrites (As. content).....	770	750	899	(a)
Italy—				
Ore.....	148	17,826	17,976	(a)
White arsenic.....			797	(a)
Portugal—				
Pyrites (As. content).....	74			(a)
White arsenic.....	148	21	1	97
Roumania—				
Pyrites (As. content).....	30	32	33	(a)
Sweden—				
Ore (As. content).....	22,944	20,623	21,141	(a)
White arsenic.....	8,510	(a)	(a)	(a)
Mexico—				
White arsenic.....	8,392	10,592	8,754	6,951
United States—				
White arsenic.....	13,731	15,013	14,897	19,947
Brazil—				
White arsenic.....	720	705	512	702
Japan—				
White arsenic.....	2,587	(a)	(a)	(a)
Korea—				
White arsenic.....	226	(a)	(a)	(a)
Turkey—				
Ore.....	16	27	25	(a)

White arsenic is also produced in Germany, U.S.S.R., and China.

(a) Information not available.

COBALT

Production of cobalt in Canada during 1939 totalled 732,561 pounds valued at \$1,213,454 compared with 459,226 pounds worth \$790,913 in 1938. The Canadian output of cobalt comes entirely from the silver-cobalt deposits of northern Ontario and includes cobalt recovered and sold in the metallic state, the cobalt content of oxides and salts made and sold and the metal content of cobaltiferous ores exported.

There is at present only one smelter in Canada treating cobalt ores; this is the plant of the Deloro Smelting and Refining Company, Limited, located at Deloro, Ontario. This Company produced mixed nickel and cobalt oxides at Deloro for the first time in 1910. Continuous operations were conducted by the Company throughout 1939 and production included cobalt metal, cobalt salts, cobalt oxide, arsenic and silver bullion. Ores and concentrates treated at the Deloro smelter in 1939 came almost entirely from the silver-cobalt mines of Northern Ontario. It is also interesting to note that in 1939, for the first time, cobalt residues were received by the Deloro Smelting and Refining Company, Limited from Northern Rhodesia. These residues will be treated by the Company for the recovery of the cobalt content. Since 1904, the first year for which cobalt production was recorded in Canada, there were produced, to the end of 1939, in all forms, 33,063,655 pounds valued at \$31,921,836. The outbreak of war in Europe in 1939 was reflected in both an increased demand and price for cobalt.

The following information is from the 1939 Minerals Yearbook of the United States Bureau of Mines:—"Consumption of cobalt in the United States in 1939, as indicated by imports, increased substantially; as in the past, the demand was supplied by imports, as there was no domestic output. Probably as a result of shipping costs and war-risk insurance, domestic quotations for 97 to 99 per cent metal in lots of 100 pounds or more were advanced during the latter part of October to \$1.50 a pound from \$1.36 and black oxide (70 to 71 per cent grade) in lots of 350 pounds or more to \$1.84 a pound from \$1.67. World production may be roughly estimated at 6,000 metric tons in 1939 compared with 4,500 tons in 1938. Output in Northern Rhodesia was two and a half times that in 1938. In 1939 imports of ore into the United States gained 36 per cent, metal 127 per cent and oxide 82 per cent.

"As a result of extensive research, the use of cobalt continues to expand, consequently world production has increased greatly. Cobalt oxide is used in the ceramic industry; cobalt salts in the preparation of driers for use in paints, varnishes, and linoleums and as a catalyst; and cobalt metal in various types of high-grade steels (especially metal cutting and magnet steels), as a catalyst, and in electroplating. Lack of statistics on the production of cobalt in the Belgian Congo, one of the chief producers, and in several smaller producing countries, precludes an accurate statement of total world output. The Rhokana Corporation Ltd., Northern Rhodesia, sold 1,124 short tons of cobalt in alloy and refined products during the year ended June 30, 1939; the cobalt plant during this period produced 4,511 short tons of alloy containing 1,761 tons of cobalt compared with 2,854 tons of alloy containing 1,183 tons of cobalt during the corresponding fiscal year 1938.

"In 1938 the output in Italy of ores containing nickel and cobalt increased to 13,421 tons, of which 130 tons contained 14 to 16 per cent nickel and 2 to 6 per cent cobalt; cobalt is also said to be obtained through electrolysis of certain zinc ores that average 50 grams of cobalt per ton. Production of cobalt ore in French Morocco was 2,880 metric tons during the first six months of 1939 and exports were 3,833 metric tons; the producing mines are about 155 miles west of Agadir in the Atlas Mountains; cobalt occurs on the surface in the form of erythrite and at depth in the form of smaltite. Imports of cobalt metal into the United States from Finland declined to 219,716 pounds in 1939 from 240,575 pounds in 1938.

"The United States, a large consumer of cobalt, has thus far failed to develop substantial supplies, but recent developments raise the hope that the United States may yet produce cobalt in commercial quantities; experiments on recovery of cobalt from the iron ores mined at Cornwall, Pa., were carried on during 1939. Cobalt, which has been long known to occur as a minor constituent of these iron ores, has been found in increased amounts in the ore bodies now being mined."

"Metal and Mineral Markets"—New York, reported prices as follows: May, 1940—Cobalt metal imported from Belgium, 97 to 99 per cent \$2.11 per pound for small lots, spot; on lots of 100 pounds or more \$1.50; corresponding prices, August, 1939 were \$1.92 and \$1.36. New York quotations for cobalt ore are based on the grade or cobalt content and prices are nominal.

Table 76.—Production of Cobalt* in Canada, 1930-1939

Year	Pounds	Year	Pounds
1930.....	694,163	1935.....	681,419
1931.....	521,051	1936.....	887,591
1932.....	490,631	1937.....	507,064
1933.....	466,702	1938.....	459,226
1934.....	594,671	1939.....	732,561

* Includes metal produced in Canada, metal in salts and oxides produced, and metal in ores exported.

Table 77.—Production in Canada, Imports and Exports of Cobalt, 1938 and 1939

	1938		1939	
	Quantity	\$	Quantity	\$
PRODUCTION (In terms of metallic cobalt and cobalt in oxides and salts sold and in ores exported).....pounds	459,226	790,913	732,561	1,213,454
IMPORTS—				
Cobalt ore.....pounds		9	541,500	148,410
Oxide of cobalt.....pounds	736	1,094	525	301
EXPORTS—				
Cobalt, contained in ore.....pounds	66,400	40,983	204,100	178,043
Cobalt, metallic.....pounds	83,579	122,101	2,600	3,250
Cobalt, alloys.....pounds	49,674	79,278	133,679	264,861
Cobalt oxides and cobalt salts.....pounds	382,408	523,218	606,942	814,807

Table 78.—Cobalt Salts used in the Manufacture of Canadian Pigments and Paints, 1932-1939

Year	Pounds	\$	Year	Pounds	\$
1932.....	17,021	10,960	1936.....	170,932	43,230
1933.....	10,885	7,463	1937.....	37,258	17,062
1934.....	26,300	14,069	1938.....	43,703	17,993
1935.....	110,419	33,292	1939.....	52,979	21,638

The Deloro Smelting and Refining Co. Ltd., is the only Canadian firm producing cobalt alloys or cobalt metal; cobalt alloys are sold by this company almost entirely for use as cutting tools and hard facing material.

Table 79.—World Production of Cobalt, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

Producing Country	1937	1938	1939
	Cwt.	Cwt.	Cwt.
BRITISH EMPIRE			
Northern Rhodesia.....	17,409	28,762	31,138
Canada (c).....	4,527	4,100	6,541
Burina (b).....	5,475	4,034	
FOREIGN COUNTRIES			
Belgian Congo.....	(d) 30,000	(d) 26,000	(a)
French Morocco (estimated).....	10,900	13,500	(a)
Mexico.....		17	
Bolivia.....	6		

Complex ores containing cobalt are produced in Finland, Germany, Greece, Japan and China, but figures of cobalt content are not available.

(a) Information not available.

(b) Estimated cobalt content of nickel-speiss exported to Hamburg.

(c) Metal recovered from smelter products plus cobalt contained in cobalt ores exported.

(d) Estimated.

SILVER

Production of newly mined silver in Canada in 1939 totalled 23,163,629 fine ounces valued at \$9,378,490 compared with 22,219,195 fine ounces at \$9,660,239 in 1938. The average price of the metal in Canadian funds was 40·488 cents per fine ounce in 1939 as against 43·47 cents in 1938. The greatest annual production of silver in Canada was in 1910 in which year an output of 32,869,264 fine ounces was recorded; the highest average yearly price per fine ounce for the metal in Canada was 111·122 cents in 1919. Production of silver in Canada since 1887, the first year for which data are available, to the close of 1939 totalled 783,664,989 fine ounces valued at \$454,691,137.

“Handy and Harman”, New York, in their review of the silver market for 1939, state: “The story of silver for 1939 may be divided into three chapters. The first covers the period from the beginning of the year to June 26 during which prices for silver of foreign origin were stabilized by United States government purchases at 43 cents. The second chapter comprises the four-month period of world market fluctuations which commenced on June 27 with a reduction in the Treasury’s buying rate, continued through the early weeks of the war, and ceased at the end of October when imports of silver were prohibited from entering England and India except under license. The third chapter extends from October 30 to the close of the year. During most of this final period two silver markets existed—the World market represented by the United States government price of 35 cents, and the Anglo-Indian market represented by sterling and rupee quotations. . . . We estimate that United States government purchases for 1939 at 341,400,000 ounces, of which amount 60,600,000 ounces were derived from domestic ores. The balance of 280,800,000 ounces consisted of foreign silver purchased under inter-government agreements and in open market, plus a negligible 500,000 ounces received in miscellaneous deposits at the mints and assay offices. The past year’s acquisitions, added to the 2,588,600,000 ounces on hand at the beginning of the year, make a total of 2,930,000,000 ounces, which represents our estimate of United States Treasury silver holdings at December 31, 1939, including coin in circulation. . . . Once again the year-end figures proclaim the futility of attempting to meet the requirements of the Silver Purchase Act that “one-fourth of the total monetary value of gold and silver stocks shall be in silver.” After five and one-half years of operation and after more than 2,200,000,000 ounces of silver have been bought, the goal set by the Act is actually 291,000,000 ounces farther away than it was when the legislation was passed in June, 1934. . . . We estimate that 34,000,000 ounces of silver were used in 1939 by the arts and industries in the United States and Canada—increases were approximately as follows: sterling silverware, 20 per cent; silver plated ware 30 per cent; motion pictures, 10 per cent; for jewelry the increase was only slight, but in dental trade it reached more than 50 per cent. In the purely industrial field, as distinct from the arts, there was a marked increase in consumption. . . . Reports covering silver coinage indicate a comparatively small world consumption for that purpose during 1939—a total of 8,900,000 ounces. . . .”

DOMINION BUREAU OF STATISTICS

"Metal and Mineral Markets," New York, in its issue of May 16, 1940, stated: "The United States Senate, on May 9, voted 45 to 36 to end the acquisition of foreign silver. The Townsend Bill, the measure presented to Congress to end such purchases, will now be sent to the House of Representatives. However, before the House acts upon the measure, it will go to the House Committee on Coinage, Weights and Measures . . .".

Table 80.—Production of Silver in Canada, by Provinces and by Sources, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Fine oz.	\$	Fine oz.	\$
NOVA SCOTIA—				
In gold bullion and in silver-lead-zinc ores exported*..... Total	988	430	173,877	70,399
QUEBEC—				
In anode copper.....	971,417	422,343	943,403	381,965
In gold ores and in copper ores exported.....	218,078	94,814	224,041	90,710
Total.....	1,189,495	517,157	1,167,444	472,675
ONTARIO—				
In silver bullion made from cobalt ores.....	1,087,703	472,901	1,465,920	593,522
In gold bullion.....	521,459	226,715	527,352	213,514
In blister copper.....	2,437,596	1,059,793	2,410,512	975,968
In ores, concentrates, residues, matte, etc., exported or treated in smelters outside the province.....	272,079	118,292	285,638	115,649
Total.....	4,318,837	1,877,701	4,689,422	1,898,653
MANITOBA—				
In blister copper.....	1,147,216	498,775	984,992	398,804
In gold bullion (gold mines).....	51,099	22,216	43,493	17,609
Total.....	1,198,315	520,991	1,028,485	416,413
SASKATCHEWAN—				
In blister copper (a).....	898,405	390,600	1,139,348	461,299
In gold bullion or in crude alluvial gold.....	8	3	2,252	912
Total.....	898,413	390,603	1,141,600	462,211
ALBERTA—				
In alluvial gold..... Total	23	10	32	13
BRITISH COLUMBIA—				
In alluvial gold.....	10,397	4,520	9,000	3,644
In gold bullion.....	110,911	48,221	94,805	38,385
In base bullion and in ores, matte, etc., exported.....	11,065,255	4,810,841	10,544,226	4,269,146
Total.....	11,186,563	4,863,582	10,648,031	4,311,175
YUKON—				
In alluvial gold.....	16,043	6,975	19,254	7,795
In silver-lead ores shipped to smelter.....	2,828,616	1,229,797	(b) 3,811,610	1,543,245
Total.....	2,844,659	1,236,772	3,830,864	1,551,040
NORTHWEST TERRITORIES—				
In pitchblende-silver ores shipped to smelters (x) and in gold bullion..... Total	581,902	252,993	483,874	195,911
Canada— Total	22,219,195	9,660,239	(c) 23,163,629	9,378,490

* Silver-lead ores exported in 1939 only.

(x) Comprises silver in silver sulphide, etc., made at the Eldorado refinery, Port Hope, Ont., plus silver in ores shipped to other metallurgical plants.

(a) Represents silver contained in blister copper made at the Flin Flon smelter from Saskatchewan ores.

(b) Includes 300 ounces from gold ores.

(c) Of this, 5,961,172 fine ounces represents silver in ores exported.

Note.—For 1939 silver was valued at 40.488 cents per fine ounce, the average price of the metal on the New York market expressed in Canadian funds; for 1938 the corresponding price was 43.477 cents.

Table 81.—Production of Silver in Canada for 1930-1939

Year	Ounces	Cents per ounce	Year	Ounces	Cents per ounce
1930.....	26,443,823	38-15	1935.....	16,618,558	64-79
1931.....	20,562,247	29-87	1936.....	18,334,487	45-13
1932.....	18,347,907	31-67	1937.....	22,977,751	44-88
1933.....	15,187,950	37-83	1938.....	22,219,195	43-48
1934.....	16,415,282	47-46	1939.....	23,163,629	40-49

Table 82.—Source of Canadian Silver Production, by Percentages, 1938-1939

Source	1938	1939
In silver-cobalt ores.....	5.7	6.5
In base bullion.....	(†) 45.7	(†) 39.7
In gold ores (bullion and placer).....	3.8	4.6
In blister and anode copper.....	24.6	23.6
In matte, copper ores and silver-lead ores, etc., exported.....	20.2	25.6
	100.0	100.0

(*) Chiefly from silver-lead ores.

(†) Includes silver recovered in Canada from pitchblende-silver ores.

Table 83.—Silver Consumed in Specified Canadian Industries, 1938 and 1939

	1938		1939	
	Fine oz.	Value	Fine oz.	Value
		\$		\$
Scientific equipment.....	(a) 696,437	310,703	562,158	241,542
Fountain pens and pencils.....				
Jewellery and silverware (fine silver).....		505,038		644,750
Jewellery and silverware (silver alloys).....		361,555		400,947
Medicinal and pharmaceutical preparations (bullion).....	45,283	20,241	45,456	18,914
Miscellaneous chemicals.....	13,089	5,759	10,067	4,027

(a) Consumed largely in the manufacture of photographic film.

Table 84.—Imports into Canada and Exports of Silver, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Fine oz.	\$	Fine oz.	\$
IMPORTS—				
Silver in bars, etc., unmanufactured.....	2,011,048	850,488	3,850,851	1,532,891
Silver, manufactures of, n.o.p., and articles consisting wholly or in part of sterling, and other silverware.....		293,193		278,521
Toilet articles of which the most important component, in value, is sterling silver.....		33,216		25,907
Total.....		1,176,897		1,837,319
EXPORTS—				
Silver contained in ore, concentrates, etc. (b).....	5,868,827	2,540,860	6,828,031	2,801,206
Silver bullion (Canadian) (a).....	22,682,687	9,838,462	14,202,549	5,723,967
Total.....	28,551,514	12,379,322	21,030,580	8,525,173
Silver bullion—Foreign (c).....	1,244,096	550,893	1,008,612	427,046
Silver coin—Foreign (subsidiary).....		1,500,837		1,200,392
Canadian.....		32,325		5,840

(a) Of these exports 21,713,359 ounces in 1938 and 13,862,258 ounces in 1939 went to the United States.

(b) In 1938, 5,573,016 ounces went to the United States and in 1939, 6,555,509 ounces.

(c) Of the quantity exported 1,062,078 ounces in 1938 and 1,008,612 ounces in 1939 went to the United States.

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Table 85.—World Production of Silver Ore, 1937-1939

(In terms of metal)

(Supplied by the Imperial Institute)

(Fine troy ounces)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES— (Concluded)			
United Kingdom.....	71,448	107,985	(a)	Poland.....	63,000	61,000	(a)
Bechuanaland Protectorate.....	1,499	1,127	813	Portugal.....	20,000	16,741	(a)
Gold Coast (estimated).....	19,000	23,000	27,000	Roumania.....	824,480	784,492	910,359
Kenya.....	7,549	11,200	13,600	Sweden.....	946,239	1,123,835	(a)
Nigeria.....	102,120	(a)	1,806	U. S. S. R. (estimated)...	6,000,000	7,000,000	(a)
Northern Rhodesia.....	83,861	88,234	80,137	Yugoslavia.....	2,242,495	2,450,000	(a)
Sierra Leone.....	1,568	(a)	(a)	Algeria.....	72,177	103,748	(a)
Southern Rhodesia.....	152,038	166,417	173,556	Belgian Congo.....	2,961,787	3,120,000	(a)
South West Africa (d).....	358,500	673,500	(a)	Morocco (French).....	241,543	(a)	(a)
Tanganyika Territory.....	11,696	16,473	(a)	Mozambique.....	1,474	1,808	2,320
Uganda (exports).....	1,379	1,981	(a)	Tunis.....	174,638	61,149	(a)
Union of South Africa.....	1,100,641	1,135,374	1,182,516	Mexico.....	84,678,921	81,016,939	75,868,824
Canada.....	22,977,751	22,219,195	23,163,629	Porto Rico.....	1	1	4
Newfoundland.....	1,447,637	1,645,590	(a)	United States.....	71,408,625	61,705,837	63,871,968
British Guiana (estimated)...	4,740	5,060	4,790	Honduras.....	3,222,824	3,346,246	4,118,864
Burma.....	6,180,000	5,920,000	(a)	Nicaragua.....	99,665	158,274	(a)
Cyprus (b).....	132,968	199,719	103,953	Panama.....	(a)	(a)	(a)
India.....	24,642	22,295	(a)	Salvador.....	2,866	14,565	3,497
Federated Malay States (estimated).....	3,000	3,500	3,500	Argentina.....	2,122,000	3,209,000	4,772,000
Sarawak.....	.....	1,660	(a)	Bolivia (exports).....	9,452,000	6,366,000	6,287,157
Australia.....	14,059,258	15,552,037	(a)	Brazil.....	25,238	25,591	(a)
Fiji.....	3,463	12,380	16,115	Chile.....	1,786,222	1,414,086	1,174,022
New Guinea (estimated).....	96,000	104,000	(a)	Colombia.....	167,971	192,879	(a)
New Zealand.....	443,981	357,709	390,342	Ecuador.....	73,350	81,974	104,519
				Guiana (French and Dutch) (estimated)...	6,000	6,000	6,000
Total.....	47,300,000	48,400,000	25,161,700	Peru.....	17,453,331	20,552,816	(b)17,600,000
FOREIGN COUNTRIES				Venezuela (estimated)...	7,000	7,000	(a)
Austria.....	3,989	(a)	(a)	China.....	200,000	(a)	(a)
Bulgaria (estimated).....	6,500	13,000	(a)	French Indo-China.....	3,537	2,411	(a)
Czecho-Slovakia.....	1,056,552	(a)	(a)	Japan.....	10,000,000	10,000,000	(a)
Finland.....	55,137	58,000	(a)		(c)	(c)	(a)
France.....	563,847	552,273	(a)	Korea.....	2,673,000	(a)	(a)
Germany.....	6,773,169	(a)	(a)	Manchuria.....	(a)	(a)	(a)
Greece.....	1,135,041	401,804	(a)	Netherlands East Indies	500,084	579,131	618,012
Hungary.....	79,277	(a)	(a)	Philippine Islands.....	719,771	1,167,612	1,247,541
Italy.....	715,000	820,000	(a)				
Norway.....	283,249	250,758	(a)	Total.....	229,000,000	206,664,970	176,585,000
				World's Total.....	276,000,000	255,064,970	201,746,700

Silver ore is also produced in Spain.

(a) Information not available.

(b) Exports.

(c) Estimated.

(d) Years ended March 31 following.

Table 86.—World's Monetary Stocks of Silver at the Close of 1938 and 1939

(Supplied by the United States Mint and subject to revision)

(Stated in United States money, 000's omitted)

Country	1938		1939	
	Silver stock in banks and treasuries(*)	Per capita	Silver stock in banks and treasuries(*)	Per capita
	\$	\$	\$	\$
United States (including Hawaii, Alaska and Porto Rico).....	5,367,771	41.07	2,860,082	21.59
Canada (1).....	30,483	2.72	28,245	2.54
Mexico (10).....	54,409	2.79	55,718	2.91
Cuba (2) (3).....	69,394	16.52	77,440	18.85
Chile (2) (4).....	334	0.07	412	0.09
Colombia.....	11,379	1.32	9,483	1.09
Peru.....	4,646	0.65	4,620	0.71
Venezuela (4).....	38,139	10.80	15,225	4.44
Uruguay.....	3,127	1.48	1,828	0.89
Belgium.....	5,791	0.69	7,070	0.85
France (3) (4).....	79,074	1.88	(11) 16,088	0.38
Germany (10).....	511,770	6.50	549,939	8.14
Bulgaria (2) (12).....	22,875	3.59	22,510	3.61
Hungary.....	2,696	0.27	4,614	0.51
Lithuania.....	6,500	2.52	6,681	2.62
Great Britain.....	280,218	5.90	.....	.....
Greece.....	2,610	0.37	1,098	0.15
Eire (8).....	4,737	1.61	6,989	2.36
Latvia (4).....	7,958	4.02	1,111	0.56
Netherlands.....	90,677	10.39	5,842	0.68
Norway.....	1,642	0.56	5,664	.....
Poland.....	72,803	2.07	.....	.....
Rumania (2) (3).....	34,912	1.76	15,926	0.81
Spain.....	.....	.....	.....	.....
Switzerland (3).....	45,274	10.75	(13) 574	.....
Sweden (4).....	218	0.03	217	.....
Yugoslavia (3).....	22,143	1.42	22,329	1.45
British Malaya.....	15,305	2.54	12,981	2.15
Indo-China—French.....	5,951	0.26	5,054	0.22
Iran (Persia) (4) (5).....	23,548	1.57	27,090	2.26
Palestine.....	5,184	3.61	5,541	3.95
Syria.....	1,185	0.33	(14).....	(14).....
British West Africa.....	7,005	0.28	10	.....
Nyasaland.....	5,345	3.26	4,342	2.65
Rhodesia, Southern (4).....	801	0.61	382	0.30
New Zealand (6).....	8,784	5.48	7,555	4.72
Ceylon.....	9,639	1.67	8,334	1.44
India—British (4).....	254,063	0.71	192,793	0.57
Morocco.....	1,952	0.27	2,752	0.44
Netherlands East Indies (10).....	51,857	0.77	49,192	0.76
Philippine Islands (7) (10).....	19,009	1.39	18,973	1.45
Thailand (Siam) (10).....	30,492	2.08	6,705	0.46
Egypt.....	19,454	1.21	(3) 16,376	1.03
Kenya, Uganda, Tanganyika and Zanzibar (9).....	16,591	1.33	15,033	1.21
Sudan—Anglo Egyptian.....	7,380	1.19	(12) 7,503	1.26
Union of South Africa.....	16,052	1.62	(4) 4,441	0.45
Australia (June 30, 1938).....	38,862	5.61	.....	.....
Algeria and Tunis.....	3,156	0.31	.....	.....
Other countries.....	139,182	.....	17,096	.....
Total.....	7,452,377	3.61	4,121,858	2.02

(*) Monetary silver stock in government treasuries, in banks, and when data available, in circulation. United States equivalent of reported face value at exchange rates.

(1) Net issues of silver coin.

(2) Includes base metal coin.

(3) Prior year's figures at new equivalents where equivalents other than the legal parity are applicable.

(4) Silver in circulation not included.

(5) As of November 21, 1939.

(6) Australian coins and notes are the circulating media.

(7) Silver converted to United States equivalent at legal rate.

(8) Exclusive of British coins and currency which still circulate in the Irish Free State.

(9) On June 30, 1939.

(10) Includes silver bullion.

(11) On December 7, 1939.

(12) At average exchange rate for 1939.

(13) Silver coins in central banks only.

(14) Data not available.

LEAD

The quantity of new lead produced in Canada during 1939 and inclusive of the recoverable metal contained in ores exported totalled 388,569,550 pounds valued at \$12,313,768 compared with 418,927,660 pounds worth \$14,008,941 in 1938.

Of the total Canadian production of lead in 1939, the mines of British Columbia accounted for 378,440,666 pounds or 97 per cent, and of this quantity the Sullivan mine, of the Consolidated Mining and Smelting Company of Canada Limited contributed by far the larger part. The production of refined primary lead by the Company in its Trail plants during 1939 totalled 381,137,424 pounds compared with 400,763,914 pounds in 1938.

The Mining Journal, London, reported as follows: "In Germany the drive for expansion of domestic production continued and the exploitation of low-grade properties in the Tyrol and Nassereith was begun. Since the outbreak of the war the British Contraband control must have had a telling effect on Germany's lead supplies. Greater Germany normally requires about 250,000 tons of lead annually, but domestic production of recoverable lead probably does not normally exceed 100,000 tons. The remainder of Germany's lead supplies are obtained from imported concentrates and imported metal. The bulk of these imports are obtained from overseas and the only really large tonnage of lead concentrates available in neighbouring countries is the Trepea output in Yugoslavia".

Table 87.—Production (†) of New Lead in Canada, 1930-1939

Year	Pounds	\$	Price per pound (Canadian funds)
			c.
1930.....	332,894,163	13,102,635	3.927
1931.....	267,342,482	7,260,183	2.710
1932.....	255,947,378	5,409,704	2.114
1933.....	266,475,191	6,372,998	2.392
1934.....	346,275,576	8,436,658	2.346
1935.....	339,105,079	10,624,772	3.133
1936.....	383,180,909	14,993,869	3.913
1937.....	411,999,484	21,053,173	5.110
1938*.....	418,927,660	14,008,941	3.344
1939.....	388,569,550	12,313,768	3.169

Maximum annual value of Canadian lead production was \$23,127,460 in 1925.

(*) Year of maximum output of Canadian lead.

(†) Lead content of base bullion produced plus lead in ores exported.

Table 88.—Refined Lead Production in Canada,* 1928-1939

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1928.....	301,067,819	1934.....	†314,457,735
1929.....	304,449,673	1935.....	†327,515,277
1930.....	304,471,706	1936.....	†363,449,490
1931.....	278,448,457	1937.....	†399,394,939
1932.....	253,136,522	1938.....	†400,763,914
1933.....	254,568,861	1939.....	†381,137,424

* Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C.; and also the pig lead from Galletta, Ont., until 1931.

† Primary lead only.

"When the British Empire declared war in 1914 it was in a very unfavourable position regarding base metals supplies. The position was completely changed by 1939. In 1914 the Empire produced 646 short tons per day of lead and zinc, whereas in 1938 the corresponding output was 2,438 short tons. Failing an Empire supply in 1914 the British were forced to buy metal wherever it could be had. Full advantage was taken of the market and prices reached 27½ cents a pound for zinc against a normal price of 4 to 5 cents and 12½ cents per pound for lead against a normal of 3 to 4 cents.

"At the commencement of the present war in September 1939 the Consolidated Mining and Smelting Company of Canada, Ltd. joined with other Empire producers in accepting what might be called a virtual conscription of their metal production, assuring the British Government of prices considerably below normal for the metal needed for the war. The terms of the contracts protect the companies from all shipping risks and as to prices are considered fair and reasonable under the circumstances. It is believed the Empire will be able to supply all of the lead, zinc, copper and nickel required." (Cons. M. & S. Co. of Can. Ltd).

Table 89.—Production in Canada, by Provinces, Imports and Exports of Lead, 1939

	Pounds	Value
		\$
PRODUCTION—		
Nova Scotia.....	2,545,122	80,655
Ontario.....	39,130	1,240
British Columbia.....	378,440,666	11,992,784
Yukon.....	7,544,632	239,089
Total.....	388,569,550	12,313,768
IMPORTS—		
Old and scrap, pig and block.....	16,846	1,822
Bars and sheets.....	88,092	5,442
Litharge.....	2,253,300	154,898
Acetate of lead.....	164,717	10,469
Nitrate of lead.....	286,801	20,860
Other manufactures.....		80,338
Pipe lead.....	69,525	3,798
Shots and bullets.....	11,726	974
Ten lead.....		
Lead arsenate.....	568,344	49,238
Lead tetraethyl, compounds of.....	6,373,494	2,927,449
Lead capsules for bottles.....		78,652
Lead pigments—		
Dry white lead.....	8,324	701
White lead, ground in oil.....	14,769	1,562
Dry red lead and orange mineral.....	450,885	31,619
Total.....		3,367,822
EXPORTS—		
Lead, contained in ore.....	8,204,200	399,811
Pig lead.....	361,471,700	9,450,265
White lead.....	256,700	20,931
Total.....	369,932,600	9,871,007

Table 90.—Available Statistics on the Consumption of Lead in Specified Canadian Manufacturing Industries, 1938 and 1939

Industries	Item used	1938	1939
		Pounds	Pounds
Brass and copper products.....	Pig lead.....	712,315	750,208
	Scrap and other lead.....	468,372	363,129
Paints and pigments.....	Pig lead*.....	13,720,025	17,949,541
White metal alloys.....	Pig lead.....	11,875,116	13,579,186
	Scrap lead.....	12,230,944	11,967,402
Electrical apparatus.....	Pig lead.....	21,467,082	23,118,853
	Scrap lead.....	154,125	237,026
	Lead sheets, etc.....	874,760	2,150,833
Iron and steel.....	Lead.....	1,306,444	1,634,429
Explosives.....	Pig lead.....	794,098	800,831
Grand Total.....		63,603,281	72,551,443

* Some products such as lead oxides made from pig lead by the paints and pigments industry are sold to other industries for the manufacture of such products as storage batteries. See preceding table for imports of lead compounds.

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Table 91.—World Production of Lead Ore, 1937, 1938 and 1939

(In terms of metal)

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	26,395	29,745	.....	Roumania.....	8,305	(a)	.....
Nigeria.....	554	296	.....	Spain (smelter) (c).....	30,000	35,000	27,000
Northern Rhodesia.....	3,890	2,911	2,710	Sweden.....	9,124	8,484	.....
Southern Rhodesia.....	24	40	116	U.S.S.R. (smelter) (c).....	55,000	67,000	.....
South-West Africa (d).....	10,100	17,700	.....	Yugoslavia.....	70,000	83,000	80,000
Tanganyika.....	32	.....	.....	Algeria.....	4,408	4,575	.....
Union of South Africa.....	102	125	57	Belgian Congo.....	4,768	10,061	.....
Canada (b).....	183,928	187,021	173,469	French Equatorial Africa.....	120	1,600	.....
Newfoundland.....	28,778	31,275	.....	Morocco (French).....	15,866	18,700	.....
Burma.....	91,200	87,600	.....	Morocco (Spanish).....	192	(a)	.....
Federated Malay States.....	.....	.....	.....	Tunis.....	12,859	18,848	.....
Australia.....	246,045	274,384	.....	Guatemala (estimated).....	50	40	50
Total.....	591,000	631,000	176,000	Mexico (b).....	214,688	277,909	216,039
FOREIGN COUNTRIES				United States (b).....	415,082	330,113	366,022
Austria.....	8,552	(e)	.....	Argentina.....	18,640	24,324	30,839
Bulgaria.....	160	335	.....	Bolivia (exports).....	17,999	12,960	13,902
Czechoslovakia.....	3,841	4,000	.....	Chile.....	(a)	120	(c)40,772
Finland.....	243	85	.....	China.....	41,374	(f)57,127	.....
France.....	4,567	4,000	.....	(a)	(a)	(a)	.....
Germany.....	77,652	(e)94,000	.....	French Indo-China.....	(c)10,000	(c)12,000	.....
Greece.....	7,134	8,104	.....	Japan (smelter).....	5,758	(c)10,000	.....
Italy.....	34,800	40,000	.....	Korea (smelter).....	.....	.....	.....
Norway.....	352	144	.....	Philippine Islands (estimated).....	15	210	.....
Poland.....	10,000	10,000	.....	Turkey.....	7,600	7,100	9,000
Portugal.....	1,289	2	.....	Brazil.....	227	569	620
				Total.....	1,090,000	1,150,000	784,000
				World's Total.....	1,680,000	1,780,000	960,000

(a) Information not available.

(b) Amount estimated as recoverable.

(c) Estimated.

(d) Years ended March 31 following.

(e) Austria included with Germany.

(f) Exports.

Table 92.—World Metal Production of Lead, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	10,150	9,800	.....	Norway.....	232	318	.....
Northern Rhodesia.....	559	273	160	Poland.....	17,309	19,667	.....
South-West Africa.....	1,333	3,163	.....	Roumania.....	6,619	5,566	4,871
Canada.....	178,301	178,912	170,151	Spain (estimated).....	30,000	35,000	27,000
Burma.....	77,650	80,200	.....	U.S.S.R. (estimated).....	55,000	65,000	.....
Australia (d).....	228,530	222,583	.....	Yugoslavia.....	3,972	8,483	10,484
Total.....	497,000	495,000	170,300	Tunis.....	24,367	23,414	.....
FOREIGN COUNTRIES				Mexico.....	198,019	227,269	.....
Austria.....	10,665	9,133	.....	United States.....	416,549	325,738	432,174
Belgium (b).....	91,836	92,683	.....	Argentina.....	11,200	10,039	13,757
Czechoslovakia.....	4,983	(e) 5,000	.....	Chile.....	516	(a)	.....
France.....	37,700	42,900	.....	Puru.....	19,379	(f) 28,825	(c) 20,647
Germany (c).....	170,451	173,200	.....	(a)	8	.....	.....
Greece.....	9,118	8,806	.....	French Indo-China.....	(e) 10,000	(e) 12,000	.....
Hungary.....	145	(a)	.....	Japan.....	5,758	(a)	.....
Italy.....	38,857	43,336	.....	Korea.....	.....	.....	.....
				Total.....	1,160,000	1,136,000	508,900
				World's Total.....	1,660,000	1,631,000	679,000

(a) Information not available.

(b) Includes base bullion as follows:—1937—8,405 long tons.

(c) Includes some secondary. Figures as published by Metallgesellschaft, which exclude secondary, are—
1937—159,800 long tons.

(d) Includes base bullion as follows:—1936—33,450 long tons

1937—41,773 “

1938—40,369 “

(e) Estimated.

(f) Exports.

ZINC

Production of zinc from Canadian ores during 1939 totalled 394,533,860 pounds valued at \$12,108,244 compared with 381,506,588 pounds worth \$11,723,698 in 1938. The quantity produced in 1939 was an all-time high record; however, the value of output was surpassed by that of the 1937 production owing to the decline from a price per pound of 4·90 cents in 1937 to 3·07 cents in 1939. Of the total production in 1939, the mines of British Columbia, chiefly the Sullivan, contributed 279,041,497 pounds, or 71 per cent. The production in British Columbia represents the recovery of the metal almost entirely in the refined state from silver-lead-zinc ores, whereas the recorded output of zinc in 1939 for Manitoba, Saskatchewan and Quebec represents the recovery of zinc chiefly in the refined state from copper-gold-silver ores. Zinc production credited to Nova Scotia in 1939 represented the recoverable metal contained in silver-lead-copper-zinc concentrates exported from old stock accumulated at the Stirling mine.

According to the Mining Journal, London, the outbreak of war dislocated the world zinc industry far more than the lead industry owing to the custom smelter problems which arose. Belgium, Holland and Norway all relied on imported zinc concentrates obtained chiefly from overseas. In Germany, domestic production continued to expand and the capture of the Polish zinc smelters (in good working order) made the third Reich easily the first European producer of metallic zinc.

Table 93.—Production* of Zinc from Canadian Ores, 1930-1939

Year	Pounds	Value
		\$
1930.....	267,643,505	9,635,166
1931.....	237,245,451	6,059,249
1932.....	172,283,558	4,144,454
1933.....	199,131,984	6,393,132
1934.....	298,579,683	9,087,571
1935.....	320,649,859	9,936,908
1936.....	333,182,736	11,045,007
1937 (b).....	370,337,589	18,153,940
1938.....	381,506,588	11,723,698
1939 (a).....	394,533,860	12,108,244

(*) Includes refined zinc and zinc in ores, etc., exported.

(a) Year of maximum Canadian zinc production.

(b) Year of highest annual value.

NOTE.—The total value of Canadian zinc production since the first recording of Canadian zinc statistics in 1898, and inclusive of 1939, totalled \$180,684,662.

Table 94.—Refined New Zinc Produced in Canada, 1931-1939

Year	Price* per pound	Short tons	Year	Price* per pound	Short tons
	cents			cents	
1931.....	2·55	118,622	1936.....	3·31	151,103
1932.....	2·41	86,141	1937.....	4·90	158,542
1933.....	3·21	91,946	1938.....	3·07	171,932
1934.....	3·04	134,917	1939.....	3·07	175,641
1935.....	3·10	149,523			

* In Canadian funds.

Table 95.—Production by Provinces in Canada, Imports and Exports of Zinc, 1939

	Pounds	Value
		\$
PRODUCTION—		
Nova Scotia.....	9,152,856	280,901
Quebec.....	28,758,759	882,606
Ontario.....		
Manitoba.....	40,302,747	1,236,891
Saskatchewan.....	37,278,001	1,144,062
British Columbia.....	279,041,497	8,563,784
Total.....	394,533,860	12,108,244
IMPORTS—		
Zinc dust.....	1,301,900	80,571
Zinc in blocks, pigs, bars and rods, and zinc plates, n.o.p.....	38,500	3,347
Zinc in sheets and strips, and zinc plates for marine boilers.....	7,004,300	547,514
Zinc spelter.....	1,200	96
Zinc white (zinc oxide).....	10,539,650	450,954
Zinc sulphate.....	566,118	14,037
Zinc, chloride of.....	2,128,454	84,230
Zinc, manufactures of, n.o.p.....		283,127
Lithopone.....	21,252,814	765,522
Total—Imports.....		2,229,458
EXPORTS—		
Zinc, contained in ore.....	41,260,600	526,905
Zinc, scrap, dross and ashes.....	3,918,500	51,741
Zinc, spelter.....	311,989,100	9,343,586
Total—Exports.....	357,168,200	9,922,232

Table 96.—Available Statistics on the Consumption of Zinc and Zinc Products in Specified Canadian Manufacturing Industries, 1938 and 1939

Industry	Items used	1938	1939
		Pounds	Pounds
	METAL		
Brass and copper products.....	{ Other zinc.....	286,395	559,567
	{ Zinc ingots and slabs.....	4,540,598	6,375,989
	{ Zinc scrap.....	47,632	50,637
White metal alloys.....	{ Zinc spelter.....	2,256,403	2,464,493
	{ Zinc scrap.....	627,551	771,921
Electrical apparatus.....	{ Zinc ingots and bars.....	1,117,940	1,764,270
	{ Zinc sheets.....	2,319,830	2,919,148
Acids, alkalies and salts.....	{ Zinc metal.....	2,717,080	4,467,640
Iron and steel.....	{ Zinc.....	26,442,237	34,149,679
Miscellaneous chemicals.....	{ Zinc sheets and spelter.....	196,543	226,965
Grand Total.....		40,552,209	53,750,309
	PRODUCTS		
Paints and pigments.....	{ Zinc oxide.....	2,616,269	3,148,377
	{ Leaded zinc oxides and zinc leads..	3,653,872	3,987,884
	{ Lithopone*.....	14,235,197	15,842,379
Electrical apparatus.....	{ Zinc chloride.....	436,562	600,074
Toilet preparations.....	{ Zinc oxide.....	41,580	39,681
	{ Zinc stearate.....	17,435	18,652

* A mixture of zinc sulphide and barium sulphate prepared by precipitation.

Table 97.—World Production of Zinc Ore, 1937, 1938 and 1939

(In terms of metal)
(Supplied by Imperial Institute)
(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom.....	7,588	11,486	.....	Roumania.....	6,184	(a)	.....
Northern Rhodesia.....	18,844	12,498	14,736	Spain (estimated).....	20,000	30,000	.....
Canada (shipments) (b)....	183,293	179,234	.....	Sweden.....	35,433	34,024	.....
Newfoundland.....	63,137	65,891	.....	U.S.S.R. (smelter) (e)....	70,000	70,000	.....
Burma.....	58,600	54,900	.....	Yugoslavia.....	48,000	41,000	.....
Australia.....	203,456	219,779	.....	Algeria.....	8,229	6,860	.....
Total.....	535,000	550,000	14,700	Belgian Congo.....	3,009	4,000	.....
FOREIGN COUNTRIES				French Equatorial Africa...	869	1,600	.....
Austria.....	2,920	(d)	.....	French Morocco.....	4,920	3,000	.....
Bulgaria.....	.....	300	.....	Tunis.....	1,180	358	.....
Belgium (c).....	3,000	3,000	.....	Mexico.....	152,183	169,498	132,047
Czechoslovakia.....	1,919	(a)	.....	United States.....	559,252	461,338	.....
Finland.....	868	339	.....	Argentina.....	15,405	20,500	32,657
France.....	891	94	.....	Bolivia (exports).....	11,347	10,537	7,055
Germany.....	162,918	(e)200,000	.....	Peru.....	17,975	14,336	.....
Greece.....	9,766	8,586	.....	China (estimated).....	4,000	(a)	.....
Italy.....	(e)70,000	(e)75,000	.....	French Indo-China.....	4,880	5,080	.....
Norway.....	8,658	7,586	.....	Japan (c).....	20,000	22,000	.....
Poland.....	68,000	69,000	.....	Korea (ore).....	(a)	(a)	.....
Portugal.....	9	(a)	.....	Turkey.....	10,500	13,400	10,400
				Total.....	1,320,000	1,290,000	182,100
				World's Total.....	1,860,000	1,840,000	197,000

(a) Information not available.

(b) The amount estimated as recoverable was—

1937.....148,742 long tons.

1938.....170,315 “

1939.....176,131 “

(c) Metallgesellschaft estimate

(d) Included with Germany.

(e) Estimated. (f) Exports.

Table 98.—World Metal Production of Zinc, 1937, 1938 and 1939

(Supplied by Imperial Institute)
(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom (b).....	62,000	55,000	.....	Italy.....	37,382	33,103	33,036
Northern Rhodesia.....	14,031	10,215	12,695	Netherlands.....	24,256	24,900	20,200
Canada.....	141,555	153,511	159,200	Norway.....	40,624	45,000	44,000
Australia.....	69,750	69,820	.....	Poland.....	105,481	106,364	116,000
Total.....	287,000	289,000	171,800	Spain (e).....	5,200	7,500	11,100
FOREIGN COUNTRIES				U.S.S.R. (e).....	70,000	70,000	90,000
Belgium.....	214,311	198,544	183,300	Yugoslavia.....	4,933	4,566	4,111
Czechoslovakia.....	7,220	8,736	.....	Mexico.....	33,558	36,910	45,526
France.....	60,000	60,000	60,000	United States (c).....	497,236	398,519	452,889
Germany.....	161,227	191,300	210,000	French Indo-China.....	4,138	4,399	5,244
				Japan.....	(e)45,000	(e)50,000	54,000
				Total.....	1,310,000	1,250,000	1,329,000
				World's Total.....	1,600,000	1,540,000	1,500,000

(b) Includes some secondary.

(c) The production by grades (including redistilled secondary) was as follows (long tons):—

	1937	1938	1939
A—High grade.....	175,046	125,229	144,651
B—Intermediate grade.....	59,939	51,900	59,456
C & D—Select and brass special.....	65,172	65,825	77,030
E—Prime western.....	243,108	183,791	216,477

(e) Estimated.

Table 99.—World Production of Electrolytic Zinc, 1937, 1938 and 1939

(Supplied by Imperial Institute)
(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Northern Rhodesia.....	10,285	7,126	.....	Germany.....	39,733	(a)	.....
Canada.....	141,555	153,511	.....	Italy.....	29,992	27,136	.....
Australia (Tasmania).....	69,750	69,820	.....	Norway.....	40,624	45,000	.....
FOREIGN COUNTRIES				Poland.....	19,300	18,600	.....
Belgium.....	7,739	8,533	.....	United States.....	104,921	83,279	113,443
France.....	24,250	28,300	.....	Japan (estimated).....	12,000	(a)	.....

(a) Information not available.

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

1. Definition of the Industry.
2. General Review.
3. Commodity statistics, including tables showing production by provinces, imports, exports, prices and world output of nickel, copper and metals of the platinum group.

1. Definition of the Industry

The nickel-copper industry in Canada includes the mining, smelting and, to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., and Clydach, Wales; during recent years matte was also exported to Norway, however, exports to that country ceased after its invasion by Germany in 1940.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production. Gold, silver, tellurium and selenium in increasing quantities are also recovered from these ores.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 11 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production and trade statistics on nickel, copper and the metals of the platinum group are given in this chapter.

General Review

The production of new nickel in Canada during 1939 totalled 226,105,865 pounds valued at \$50,920,305 compared with 210,572,738 pounds worth \$53,914,494 in 1938. Almost the entire production of Canadian nickel in 1939 originated in the nickel-copper ores of the Sudbury district, Ontario, and represented the recovery of the metal in the refined state, in oxides and salts, and in matte exported. In addition to the nickel obtained from the Sudbury ores, there is a relatively small quantity of the metal recovered annually in the treatment of silver-cobalt ores from the Cobalt district of Northern Ontario. The quantity of nickel produced from Canadian ores during the year under review was the greatest in the history of the industry. Copper recovered in 1939 from nickel-copper ores totalled 328,144,517 pounds valued at \$32,608,528 or 53.9 per cent and 53.5 per cent respectively of the total quantity and value of new copper produced from all sources in the Dominion in 1939. The nickel-bearing deposits of the Sudbury area also contain relatively high values in platinum metals which are recovered in refining operations.

In addition to production of nickel, copper, and the platinum metals, there is an important recovery from these ores of the associated metals—silver, gold, selenium and tellurium; sulphur for the manufacture of sulphuric acid is also salvaged in the gaseous state from waste smelter gases. The total gross value of the various primary products of the Canadian industry, considered as a whole, was estimated at \$95,714,524 in 1939 compared with \$96,309,239 in 1938. Silver recovered by the industry in 1939 amounted to 2,496,632 fine ounces, while the production of gold during the same period totalled 77,094 fine ounces. In 1926 the corresponding production of gold from these same ores was only 4,447 fine ounces.

Two companies operated both mines and metallurgical plants in the Sudbury area. The International Nickel Co. of Canada, Limited, conducts smelting operations at Copper Cliff and Coniston, Ontario, while the Falconbridge Nickel Mines, Ltd., smelt their ores at the Falconbridge mine located a few miles east of the town of Sudbury. This last named company treated their matte in a refinery located at Kristiansand, Norway, until the invasion of that country by Germany in 1940. The relatively small amount of nickel oxide produced at DeLoro, Ontario, is recovered from silver-cobalt-nickel-arsenic ores mined in Northern Ontario. Smelter matte made by the International Nickel Co. of Canada, Limited, is treated in plants located at Clydach, Wales; Huntington, West Virginia, and at Port Colborne and Copper Cliff, Ontario. Converter copper made by the International Nickel Co. is electrolytically refined at Copper Cliff.

Capital employed in Canada by the nickel-copper mining, smelting and refining industry during 1939 was reported at \$128,302,729. Employees totalled 11,494 and \$20,557,838 were distributed as salaries and wages. Fuel and electricity used in 1939 were valued at \$7,437,370 and the cost of chemicals, explosives and other process supplies consumed totalled \$12,068,595.

Four mines and the Frood open pit were worked continuously by the International Nickel Co. during 1939; 7,273,835 tons of ore were mined of which 3,200,869 tons came from the Frood, 1,521,694 tons from the Frood open pit, 1,298,752 tons from the Creighton, 926,908 tons from the Levack and 325,612 tons from the Garson. A program of open pit mining was under way at the Stobie mine, where a large body of low-grade ore exists.

The International Nickel Company's concentrator was operated to capacity and 5,876,501 tons of ore were milled, comparable with 4,519,652 tons in 1938. Plans have been approved to increase the capacity of the concentrator to 20,000 tons per day in order to treat additional tonnages of ore from the open pit mining operations. Ore smelting at the Copper Cliff smelter was uninterrupted and 185,578 tons of bessemer matte and 165,129 tons of converter copper were produced during the year. The Coniston smelter ran continuously, processing 852,525 tons of ore and producing 50,587 tons of bessemer matte. At Port Colborne, Ontario, the nickel refinery produced 131,730,117 pounds of refined nickel, comparable with 124,233,682 pounds in 1938. At Copper Cliff the electrolytic copper refinery received 165,129 tons of molten converter copper from the Copper Cliff smelter and produced 150,541 tons of refined copper. In Wales, the nickel refinery at Clydach produced 43,962,458 pounds of pellet nickel and in addition 1,801,498 pounds of nickel sulphate; the Orford process plant was in operation during the entire year and the chemical department transferred from Smelthwick was brought into production in March, 1939. Production of platinum metals at the Acton platinum metals refinery was 4 per cent less than in 1938.

Work on the nickel mine and smelter at Kolosjoki (Petsamo) Finland continued until the invasion of Finland in November. Prior to the occupation of the property by Russian troops, the Canadian and American employees of the company left for Norway and returned home. Until the outbreak of hostilities the indications were that the mine would come into production not later than the early months of 1941.

The total number of employees of the International Nickel Company at the end of 1939 was 18,123 distributed as follows: Canada 11,745; Great Britain, 3,754; United States, 2,585; other countries, 39. Employees on December 31, 1938, including 1,457 in Finland, numbered 17,282.

Proven ore reserves at December 31, 1939, excluding Petsamo Nikkeli O/Y (Finland) were 224,594,000 short tons, an increase of 12,226,000 tons over the figures reported a year previous. The nickel-copper contents of the ore reserves are calculated to be 7,214,000 tons.

Falconbridge Nickel Mines Ltd. reported that in 1939 ore treated totalled 576,801 tons after deducting 9,848 tons of waste picked and discarded from the hoisted ore, and adjusting for differences in above-ground storage. This tonnage consisted of 332,724 (57.7 per cent) milling ore and 244,077 (42.3 per cent) smelting ore. Matte produced totalled 16,965.3 short tons containing 9,232.5 short tons of nickel and 4,691.9 short tons of copper. Metals recovered per ton of ore treated were 32.01 pounds of nickel and 16.27 pounds of copper. Ore reserves as of December 31, 1938 were Falconbridge mine 5,863,000 tons, outside holdings 1,018,000 tons. New ore added at the Falconbridge mine in 1939 amounted to 1,206,661 tons.

The Falconbridge ore dressing plant, mill and smelter operated throughout 1939 with a minimum of lost time for interruptions and repairs. The nickel refinery at Kristiansand, Norway, operated steadily throughout the year, although somewhat hampered by delayed matte shipments during the beginning of the war. The precious metals separating plant, which for some time had produced pure gold, silver, platinum and palladium, was about ready at the close of the year for separation of iridium, rhodium and ruthenium. Metals in matte received at the refinery (less refining losses) during 1939 consisted of 17,346,693 pounds of nickel and 8,601,022 pounds of copper. Falconbridge and custom refined metals produced in 1939 were 20,113,286 pounds of nickel and 10,071,269 pounds of copper.

Early in April, 1940 the Kristiansand refinery fell under the control of the German invaders and Falconbridge Nickel Mines Ltd. later announced that the refinery at that time was unharmed and that the Germans were probably operating the plant to liquidate its stock of raw material

and metals in process; the Company estimated that it would take five or six months to complete clean-up operations of this nature. Early in 1940, a first shipment of Falconbridge matte was made to the International Nickel Company plant at Copper Cliff for testing purposes.

Nickel Offsets Ltd., with properties in the townships of Foy, Bowell and Morgan of the Sudbury district, conducted surface operations from May 1 to January 15, 1940 and completed several thousand feet of diamond drilling. At Yale in British Columbia the Western Nickel Corp. reported only camp work and supply packing; these operations were carried on during the period November 28 to December 28, 1939.

Table 100.—Principal Statistics of the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1938-1939 (*)

	1938	1939
Number of firms.....	(f) 9	(e) 4
Number of mines.....	12	7
Number of smelters.....	3	3
Number of copper refineries.....	(g) 1	1
Number of nickel refineries.....	1	1
Capital employed.....	\$ 111,947,698	128,302,729
Number of employees—On salary.....	329	341
On wages.....	10,075	11,153
Total.....	10,404	11,494
Salaries and wages—Salaries.....	\$ 1,114,511	1,195,565
Wages.....	\$ 17,122,883	19,362,273
Total.....	\$ 18,237,394	20,557,838
Fuel and purchased electricity used (c).....	\$ 6,675,789	7,437,370
Process supplies used (b).....	\$ 10,778,672	12,068,595
Estimated gross value of matte exported and Canadian refinery products (d).....	\$ 96,309,239	95,714,524
Value of production less items (b) and (c).....	\$ 78,854,778	76,208,559

* Does not include data for mines, power plants, etc., operated by subsidiary companies, data for copper refining in Ontario included in 1939 but not in previous years.

(d) Data for 1938 represents the values of products made in Canada from new or primary material only and do not include the value added in the electrolytic refining or other treatment of converter copper, scrap copper, customs ores, etc., in plants operated by subsidiary companies; value added in electrolytic copper refinery included in 1939, but not in previous years.

(e) Three firms reported as active in Ontario and one in British Columbia.

(f) Seven firms in Ontario, two in British Columbia.

(g) In existence but not included as part of the nickel-copper mining, smelting and refining industry prior to 1939.

Table 101.—Output from Canadian Nickel-Copper Mines, Refineries and Smelters, 1937-1939

(Short tons)

	1937	1938	1939
Ore shipped from mines.....	6,318,907	6,276,232	7,850,636
Ore and concentrates treated (*).....	6,304,517	6,280,283	7,839,187
Blister copper produced in Ontario (a).....	154,415	147,439	155,860
Nickel produced in Ontario (b).....	73,650	62,141	65,883
Matte exported (c).....	58,673	63,423	71,315
Nickel content of matte exported.....	38,663	43,075	47,057
Copper content of matte exported.....	6,497	6,914	8,212

(*) Represents the tonnage of crude ore smelted, together with the tonnage of ore milled; also in addition to the totals recorded for 1937 a relatively small tonnage of nickel-bearing ore was exported from a property located in British Columbia.

(a) Copper content.

(b) Includes nickel content of salts and oxides produced.

(c) Less a relatively small tonnage of matte returned annually to Canada for retreatment since 1934.

Table 102.—Capital Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1939

	\$
Present cash value of the land (excluding minerals).....	3,791,730
Present value of buildings, fixtures, machinery, tools and other equipment.....	102,633,334
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	13,184,465
Inventory value of finished products on hand.....	4,164,605
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,528,595
Total	128,302,729

Table 103.—Employees, Salaries and Wages, in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1939

	On salary		Mine		Mill	Total	Salaries and wages
			Surface	Under- ground			
	Male	Female					
Salaried employees—							\$
Mine and Mill.....	72	2				74	263,920
Smelters and refineries.....	205	62				267	931,645
Total	277	64				341	1,195,565
Wage-earners—							
Mine and mill.....			915	4,508	262	5,685	10,696,790
Smelters and refineries.....			5,468			5,468	8,665,483
Total			6,383	4,508	262	11,153	19,362,273
Grand Total	277	64	6,383	4,508	262	11,494	20,557,838

Table 104.—Number of Wage-Earners Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, by Months, 1938 and 1939*

Month	1938	1939	Month	1938	1939
January.....	10,540	10,361	July.....	9,766	11,373
February.....	10,528	10,355	August.....	9,752	11,496
March.....	10,501	10,627	September.....	9,847	11,281
April.....	10,429	10,952	October.....	9,943	11,235
May.....	10,314	11,287	November.....	9,690	11,687
June.....	9,965	11,428	December.....	9,589	11,757

* Includes data for copper refining for the first time in 1939.

NICKEL

Production figures include nickel in matte exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts produced, valued in the aggregate at the price obtained from the sales of oxides or salts.

Table 105.—Production of Nickel from Canadian Ores, 1930-1939

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
		\$			\$
1930.....	103,768,857	24,455,123	1935.....	138,516,240	35,345,103
1931.....	65,666,320	15,267,454	1936.....	169,739,393	43,876,525
1932.....	30,327,968	7,179,862	1937.....	224,905,046	59,607,176
1933.....	83,264,658	20,130,480	1938.....	210,572,738	53,914,494
1934.....	128,687,340	32,139,425	1939.....	226,105,865	50,920,805

Table 106.—Production in Canada, Imports and Exports of Nickel, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Lb.	\$	Lb.	\$
PRODUCTION—				
Nickel in matte exported.....				
Refined and electrolytic nickel produced.....	210,572,738	53,914,494	226,105,865	50,920,305
Nickel in oxides and salts sold or produced.....				
IMPORTS—				
Nickel, nickel silver and German silver in ingots or blocks, n.o.p.....	24,226	6,603	246,078	62,534
Nickel in bars and rods, strips, sheets and plates.....	830,904	330,131	992,282	388,751
Nickel silver and German silver in bars, rods, strips, sheets, plates or anodes.....	82,569	22,107	107,144	28,984
Nickel chromium in bars or rods, etc.....	43,472	41,805	48,597	48,616
German, Nevada and nickel silver, manufactures of, not plated.....		134,791		161,403
Nickel-plated household hollow-ware.....		403		680
Nickel kitchenware.....		1,105		400
Nickel-plated ware, n.o.p.....		864,393		890,602
Total nickel and its products.....		1,401,338		1,581,970
EXPORTS—				
Total (metal in all forms).....	197,704,000	52,496,417	234,781,300	57,933,511

The nickel refining capacity of the International Nickel Co. of Canada, Limited, at the end of 1939 was 50,000,000 pounds per annum at Clydach, Wales, and 150,000,000 pounds (electrolytic nickel) at Port Colborne, Ontario. In addition, the company has a capacity to produce 35,000,000 pounds of nickel in the form of oxide, alloys, salts and other forms.

During 1939 there were 300 tons of nickel metal valued at \$187,001 consumed in Canada in the manufacture of alloy steels compared with 290 tons at \$176,534 in 1938.

World consumption of nickel increased in 1939 and attained a new peak estimated to be 256,000,000 pounds. Sales by the International Nickel Company of Canada, Ltd., have constituted between 80 and 85 per cent of total world consumption over the period 1935 to 1939 inclusive. The increase in world consumption in 1939 was fairly well distributed among the principal nickel consuming industries; the steel industry, which continues to absorb over half of world nickel production, operated in most countries at higher rates during the year and its nickel requirements were proportionately greater. Some of this increase was undoubtedly attributable to the accelerated rate of naval construction and armament production. No exports of any of the International Nickel Company's nickel, copper or platinum metals were made to any destination outside of the British Empire without government sanction.

Table 107.—World Production of Nickel Ore, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(In terms of metal)

(Long tons)

Producing country	1937	1938	1939	Producing country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Southern Rhodesia (estimated).....	4	75	480	Greece (e).....	951	1,188	
Union of South Africa.....		44	392	Norway.....	863	1,236	
Canada.....	100,404	94,006	100,940	U.S.S.R. (estimated).....	2,000	2,500	
Burma (b).....	1,214	944		Egypt.....	14	32	
Australia.....		20		Morocco (French).....	250	316	
Total.....	101,600	95,100	102,000	United States (d).....	196	371	532
FOREIGN COUNTRIES				Brazil.....	102	369	25
Italy.....	67	(a)		New Caledonia (c).....	11,100	12,300	
				Total.....	15,500	18,000	
				World's Total.....	117,000	113,000	

Nickel ores are also produced in Germany and the Netherlands East Indies.

(a) Information not available.

(b) Nickel content of spels obtained as a by-product in smelting operations.

(c) Estimated content of ore as mined. The estimated content of ore, matte, etc., exported was—

1937..... 5,800 long tons

1938..... 7,250 "

(d) Nickel content of salts and nickel produced as a by-product in the electrolytic refining of copper (partly from imported blister copper).

Secondary metal was recovered in the United States as follows:—

1937..... 2,143 long tons

1938..... 2,054 "

1939..... 2,607 "

(e) Figures represent combined totals of nickel content and cobalt content of ores.

COPPER

Production of new copper in 1939 from all types of Canadian ore, totalled 608,825,570 pounds valued at \$60,934,859. This is the greatest annual output of the metal ever attained by the Canadian Mining Industry and its value was only exceeded by that of 1937 when production reached an all time high of \$68,917,219. Transposed into Canadian Funds the average price of copper, based on the London market, was 10.002 cents per pound in 1939 compared with corresponding prices of 9.972 cents in 1938 and 13.078 cents in 1937. In 1939 Canada ranked third as a world Copper Producing Country, its output being exceeded only by those of the United States and Chile.

Of the total Canadian Copper output during the year, under review, 505,671,337 pounds represents the metal contained in blister or anode copper produced in Canadian Smelters, 86,730,679 pounds in ores, concentrates exported and 16,423,559 in nickel-copper matte shipped to plants outside the Dominion. The Nickel-Copper ores of the Sudbury district of Ontario constituted the greatest single source of the metal in 1939, production from these ores comprising almost the entire Ontario output of 328,429,665 pounds. Production in Quebec originated chiefly in the copper-gold ores of the Horne and other Copper-Gold properties located in the North Western Part of the Province; the Eustus mine located in South Eastern Quebec and Canada's oldest copper producer ceased operations in 1939 owing to exhaustion of ore reserves. The balance of Canadian Production in 1939 came principally from the Flin Flon mine located on the Manitoba-Saskatchewan boundary and from the Britannia and Granby (Copper Mountain) mines in British Columbia. Shipments of concentrates from Stock Piles of the Sterling Mine in Nova Scotia accounted for 1,269,179 pounds of copper in the total Canadian Production.

The International Nickel Company of Canada Limited reported that World Copper consumption in 1939 exceeded that of any previous year and was estimated to have been in excess of 2,500,000 short tons, as compared with 2,200,000 tons in 1938. A major portion of this increase occurred in the United States market. In common with other Canadian Copper Producers the Company, after the beginning of the War, entered into Term Contract with His Majesty's Ministers of Supply for the delivery of a substantial tonnage of Copper, in consequence of which its production will currently be required for delivery in the United Kingdom and Canada.

Table 108.—Production (*) of New Copper in Canada, from All Sources, 1928-1939

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1928.....	202,696,046	28,598,249	1934.....	364,761,062	26,671,438
1929.....	248,120,760	43,415,251	1935.....	418,997,700	32,311,960
1930.....	303,478,356	37,948,359	1936.....	421,027,732	39,514,101
1931.....	292,304,390	24,114,065	1937.....	530,028,615	68,917,219
1932.....	247,679,070	15,294,058	1938.....	571,249,664	56,554,034
1933.....	299,982,448	21,634,853	1939.....	608,825,570	60,934,859

* Including copper in ores and matte exported and in blister and anode copper made in Canada.

Table 109.—Production of Copper in Canada, by Provinces and Sources, 1938 and 1939

	1938		1939	
	Pounds	Value	Pounds	Value
		\$		\$
PRODUCTION—				
By Provinces—				
Nova Scotia.....			1,269,179	128,086
Quebec.....	112,645,797	11,233,039	117,238,897	11,831,749
Ontario.....	309,030,106	30,405,500	328,429,665	32,637,305
Manitoba.....	65,582,772	6,539,914	70,458,890	7,110,711
Saskatchewan.....	18,156,157	1,810,532	18,133,149	1,829,997
British Columbia.....	65,759,265	6,557,514	73,253,408	7,392,734
Northwest Territories.....	75,567	7,535	42,382	4,277
Total.....	571,249,664	56,554,034	608,825,570	60,934,859
By Sources—				
In blister and anode copper produced.....	475,611,107	47,427,940	505,671,332	51,032,350
In ores, concentrates and copper matte exported (a).....	81,810,070	8,158,100	86,730,679	8,752,860
In nickel copper matte exported.....	13,828,487	967,994	16,423,559	1,149,649
Total.....	571,249,664	56,554,034	608,825,570	60,934,859

(a) Contains a relatively small quantity of copper contained in gold and silver ores shipped to Canadian smelters.

Table 110.—Production (a) of Refined Copper in Canada for Years Specified

Year	Tons	Year	Tons
1915.....		1935.....	173,290
1916*.....	483	1936.....	191,595
1917.....	3,901	1937.....	215,080
1918.....	3,809	1938.....	227,240
1919.....	3,467	1939.....	231,684

* First electrolytic copper produced commercially in Canada.

(a) From all sources.

Table 111.—Available Statistics on the Consumption of Copper in Specified Canadian Industries, 1938 and 1939

Industry	Item (Used)	1938	1939
Brass and copper products (a).....	Ingots, wire bars, slabs, etc.....lb.	101,588,470	119,161,178
	Scrap.....lb.	3,929,241	3,770,561
	Pipe and tubing.....lb.	87,904	75,177
	Plates and sheets.....lb.	773,770	710,612
	Wire.....lb.	237,858	310,485
	Other.....lb.	34,087	112,730
White Metal Alloys.....	Scrap, all kinds.....lb.	2,162,192	2,411,785
	Copper—ingots and slabs.....lb.	51,017	115,851
Electrical Apparatus and Supplies.....	Castings.....lb.	89,121	66,283
	Ingots, slabs, wire bars, etc.....lb.	669,615	694,178
	Rods.....lb.	24,152,604	29,159,186
	Scrap.....lb.	42,751	44,554
	Tubing and pipe.....lb.	322,969	303,897
	Sheets and plates.....lb.	353,806	440,535
	Wire, bare.....lb.	4,855,851	5,216,630
	Wire, enamelled.....\$	395,887	351,172
	Wire, other insulated.....\$	821,389	939,583
Iron and Steel and Their Products.....	Copper sheets, bars, etc.....lb.	5,594,848	6,842,523

(a) A relatively large part of the copper included under this industry is rolled into wire rods, which are sold to manufacturers of electrical cable; duplication to this extent results from the inclusion of these rods in the Electrical Apparatus Industry.

Table 112.—Imports into Canada and Exports of Copper, 1939

	Pounds	Value
IMPORTS—		\$
Copper in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires and electric cables for use only in the manufacture of such articles in their own factories.....	1,225,400	178,492
Copper bars for use only in the manufacture of rods to be used exclusively in the manufacture of electrical conductors, and copper rods for such manufacture, individual units of conductors not to exceed area of No. 7-0 gauge conductor.....	5,200	655
Copper in bars or rods, in lengths of not less than 6 feet, unmanufactured.....	223,700	37,165
Copper in blocks, pigs or ingots.....	6,000	1,325
Copper, scrap, cathode plates, etc.....	35,200	3,807
Copper in strips, sheets or plates not polished or coated.....	226,500	56,531
Copper tubings in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured.....	377,514	108,955
Copper wire.....	34,305	6,681
Copper wire cloth, or woven wire of of copper.....		5,076
Copper, manufactures of, n.o.p.....		448,147
Copper, precipitate of, crude.....	91	17
Anodes of nickel, zinc, copper, silver or gold.....		6,063
Copper, sub-acetate of, or verdigris, dry.....		
Copper, sulphate of (blue vitriol).....	6,285,766	234,259
Copper rollers adapted for use in calico printing.....		84,302
Total.....		1,171,475
EXPORTS—		
Copper, fine, contained in ore, matte, regulus, etc.....	121,500,900	8,505,064
Copper blister.....	31,111,800	3,113,742
Copper, old and scrap.....	6,930,000	544,901
Copper in ingots, bars, cakes, slabs and billets.....	331,637,700	33,730,487
Copper in rods, strips, sheets, plates and tubing.....	58,739,300	6,501,892
Copper wire and cable.....		522,255
Copper wire, bare.....		237,861
Copper wire, screen.....		16,772
Copper manufactures, n.o.p.....		54,945
Total.....		53,227,919
Copper coin, foreign.....		15,015
Copper coin, Canadian.....		239

Table 113.—Canadian Copper Ore Reserves as Officially Reported

(American Bureau of Metal Statistics)

—	Year	Province	Short tons ore	Average grade	Short tons copper
				%	
Falconbridge (a).....	1939	Ontario.....	7,502,000	0.94	70,500
Granby Consolidated—Allenby.....	1939	British Columbia..	14,438,006	1.38	199,200
Hudson Bay.....	1933	Manitoba.....	27,534,000	2.23	614,000
International Nickel (a).....	1939	Ontario.....	224,594,000	.....	(b) 7,214,000
Noranda.....	1939	Quebec.....	29,513,000	2.32	684,700
Normetal.....	1935	Quebec.....	782,600	2.13	16,700
Sherritt Gordon.....	1939	Manitoba.....	4,860,000	2.33	115,700
Waite-Amulet.....	1939	Quebec.....			
Amulet section.....			3,427,136	5.96	204,300
Waite section.....			550,000	4.25	23,400
Britannia.....		British Columbia..	(c)	(c)	(c)
Consolidated Copper and Sulphur.....		Quebec.....	(d)	(d)	(d)
Aldermac Mines Ltd.....	1938	Quebec.....	1,716,000	2.00	34,300

(a) Also produces nickel.

(b) Copper-nickel content.

(c) Data not available.

(d) Closed 1939.

METALS OF THE PLATINUM GROUP

The entire output of the metals of this group was derived from the nickel-copper ores of the Sudbury district in Ontario with the exception of 25 ounces of platinum recovered from alluvial workings in the Province of British Columbia. The average price of platinum in 1939 on the London market was £7.631 compared with £6.55 in 1938.

Platinum metals contained in matte from Sudbury ores by the International Nickel Company of Canada Limited are refined at Acton, England, and the same metals contained in matte produced in the Sudbury area by the Falconbridge Nickel Mines Limited were recovered until the German seizure of the refinery of that company, at Kristiansand, Norway.

International Nickel Company reported that world consumption and production of platinum group metals in 1939 were estimated to have been substantially in balance at about 500,000 ounces. Increased demand for platinum metals during the year was apparently well distributed among the principal markets, although industrial requirements were somewhat more active than jewellery and other ornamental requirements. The company's platinum metals were sold principally in the United States and in the United Kingdom. The production and use have been established of platinum-clad base metals in the form of sheet, strip and tubing suitable for chemical manufacturing equipment and other purposes where substantially incorrodible platinum surfaces are required at minimum cost. A new development occurred during 1939 in the rayon industry, where platinum-rhodium spinnerets have taken the place of the older platinum-gold spinnerets. Platinum has continued its progress in the glass fibre industry, where it is used for extrusion dies and feeder apparatus. In the electrical and allied fields, palladium, platinum and their alloys, used for relay contacts and other purposes, play an increasingly important role. The conservation of gold by many countries is assisting the demand for platinum metals, particularly palladium, and the use of palladium as a substitute for gold alloys for dental restorations, pen points and jewellery articles is making substantial headway. Platinum metals requirements for jewellery during 1939 were perhaps equal to those for 1938.

Canada is at present the largest world producer of the platinum metals. In 1938, the last year for which complete world data are available, the output of the principal producing countries was as follows: Canada, 292,203 fine ounces platinum metals; Russia, 120,000 ounces crude platinum; Union of South Africa, 58,734 ounces (crude and fine) platinum metals, and Colombia 29,460 ounces crude platinum. The United States, in 1938, reported a production of 42,043 ounces of crude platinum from placers; 7,247 troy ounces from domestic ores, etc. (refineries); and 64,291 troy ounces of secondary platinum metals. The United States is an important refining centre of both domestic and foreign platinum metals.

Table 114.—Production of Platinum Group Metals in Canada, 1938 and 1939

	Platinum		Palladium, Rhodium, Iridium, etc.	
	Fine ounces	\$	Fine ounces	\$
1938				
Ontario.....	161,310	5,196,279	130,893	3,677,342
British Columbia.....	16	515		
Total.....	161,326	5,196,794	130,893	3,677,342
1939				
Ontario.....	148,877	5,221,712	135,402	4,199,622
British Columbia.....	25	877		
Total.....	148,902	5,222,589	135,402	4,199,622

Table 115.—Production of Metals of the Platinum Group, 1930-1939

Year	Platinum				Palladium*	
	Lode		Placer			
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1930.....	34,007	1,542,490	17	771	29,959	689,217
1931.....	44,725	1,595,117	50	1,783	39,313	786,260
1932.....	27,284	1,097,021	59	2,372	29,727	548,582
1933.....	24,746	856,190	40	1,400	31,009	645,043
1934.....	116,177	4,488,712	53	2,051	83,932	1,689,228
1935.....	105,335	3,444,455	39	1,275	84,772	1,962,937
1936.....	131,551	5,319,922	20	809	103,671	2,483,075
1937.....	139,355	6,751,750	22	1,066	119,829	3,179,782
1938.....	161,310	5,196,279	16	515	130,893	3,677,342
1939.....	148,877	5,221,712	25	877	135,402	4,199,622

* Since 1933 includes other platinum metals, except platinum.

Table 116.—Production of Certain Metals of the Platinum Group, 1926-1932*

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			342	78,553
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						
1932.....	(a) 7,886	353,308						

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

* Since 1933 these metals are included with palladium as shown in preceding table.

Table 117.—Imports into Canada and Exports of Platinum, 1939

	Ounces	Value
IMPORTS—		\$
Platinum retorts, pans, condensers, tubing, pipe and preparations of.....		10,925
Platinum wire and bars, strips, sheets or plates, also platinum, palladium, iridium, osmium, ruthenium and rhodium in lumps, ingots, powder, sponge or scrap.....		221,298
Platinum crucibles.....		1,916
Total.....		234,139
EXPORTS—		
Platinum, and metals of the platinum group contained in concentrates or other forms.....		6,136,752
Platinum, old and scrap.....	1,214	41,475
Total.....		6,178,227

Table 118.—Platinum Consumed in Canadian Jewellery and Silverware Industry, 1932-1939

Year	Value	Year	Value
	\$		\$
1932.....	26,928	1936.....	101,129
1933.....	35,714	1937.....	112,295
1934.....	38,307	1938.....	85,503
1935.....	45,627	1939.....	160,688

Table 119.—Platinum Metals Sold in the United States, as Reported by Refiners and Shown by Consuming Industries, 1939

(From Minerals Year Book, U.S. Bureau of Mines)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
Chemical.....	20,306	468	187	626	21,587	14
Electrical.....	11,952	21,510	917	429	34,808	22
Dental.....	13,755	22,989	120	19	36,883	23
Jewellery.....	47,385	5,899	3,014	432	56,730	36
Miscellaneous and undistributed.....	6,868	540	84	857	8,349	5
Total.....	100,266	51,406	4,322	2,363	158,357	100

Table 120.—World Production of Platinum Metals 1937-1939

(Supplied by Imperial Institute)

(Troy ounces)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
Sierra Leone—				U.S.S.R.—			
Crude platinum.....	308	180	83	Crude platinum (estimated).....	100,000	120,000	.....
Union of South Africa—				Abyssinia (b)—			
Crude (Pt. metals content).....	17,776	18,256	18,068	Crude platinum.....	(a)	(a)	.....
Concentrates (Pt. metals content).....	21,849	35,124	41,243	Belgian Congo—			
Osmiridium (crude) (c)...	5,790	5,354	7,031	Palladium.....	12,506	225	.....
Canada—				Platinum.....	2,122	1,575	.....
Crude platinum (Pt. content).....	22	16	23	United States (d)—			
Recovered from Ontario nickel-copper matte—				Crude platinum.....	10,803	40,932	35,060
Platinum.....	139,355	161,319	148,877	Ore (Pt. metals content).....	124	90	66
Other platinum metals..	119,829	130,893	135,402	New platinum metals recovered by refineries from gold and copper ores of domestic origin:			
New South Wales—				Platinum.....	4,761	3,761	5,270
Crude platinum.....	46	(a)	.....	Palladium.....	5,776	3,429	3,330
Tasmania—				Iridium, osmiridium, etc.	41	57	34
Osmiridium (crude).....	586	19	283	Colombia—			
New Zealand—				Crude platinum.....	29,315	29,460	(e) 39,070
Crude platinum.....	55	1	13	Panama—			
Papua—				Crude platinum.....	267	.....	.....
Crude platinum.....	20	.....	.....	Japan—			
Osmiridium (crude).....	8	22	.....	Crude platinum.....	(a)	(a)	.....

(a) Information not available.

(b) Amount registered, which is probably not total production.

(c) It is estimated by the Department of Mines, Union of South Africa, that the osmiridium sold during these years contained the following amounts of the metals mentioned below (fine ounces):—

	1936	1937	1938
Osmium.....	1,670	1,695	1,701
Iridium.....	1,432	1,493	1,563
Ruthenium.....	730	764	813
Platinum.....	641	639	634
Rhodium.....	25	27	30

(d) Secondary platinum metals recovered in the United States were as follows (troy ounces):—

	1936	1937	1938	1939
Platinum.....	55,959	55,926	44,654	45,432
Palladium.....	6,786	12,680	13,489	13,039
Iridium.....	2,204	2,320	2,150	3,150
Other platinum metals.....	1,217	1,280	3,998	1,822

(e) Exports.

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics Showing Production by Provinces, Imports, Exports, Prices and World Output Tables on Aluminium, Antimony, Barium, Beryllium, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Radium, Selenium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Uranium, Vanadium and Zirconium.

1. General Review

Metal-bearing minerals, mined in relatively small quantities by a comparatively few operators, have been grouped by the Dominion Bureau of Statistics for consideration as a single industry. Included with the finally revised statistics relating to the Canadian production of these, are notes and statistical data pertaining to various rare or semi-rare metals or metalliferous ores produced in other countries. Metals or metal-bearing ores produced in Canada during 1939 and classified as miscellaneous include—antimony, bismuth, cadmium, iron ore, mercury, molybdenite, radium and uranium products, selenium, tellurium, tungsten concentrates and titanium ore. In addition to particulars relating to these metals or products, the bulletin contains notes of a summary nature on aluminium, beryl and beryllium, lithium, magnesium, sodium, calcium, tin, vanadium and zirconium.

It is to be noted that the majority of the metals listed above as Canadian products and including bismuth, cadmium, selenium and tellurium, represent by-products recovered in the refining of lead, zinc or copper and, for this reason, such statistics as relate to their production in Canada are included with those of either the silver-lead-zinc mining industry, the copper-gold-silver industry, or the non-ferrous smelting and refining industry.

ALUMINIUM

The reduction of aluminium ores and the production of primary aluminium in Canada is confined to the province of Quebec. In this province the Aluminum Company of Canada, Limited, operates an ore treatment plant at Arvida and reduction plants at both Arvida and Shawinigan Falls. These three plants were in continuous operation throughout 1939. At the Arvida ore plant concentrates were made from British Guiana bauxite and aluminium ingot was produced in the two reduction works. The company also operates fabricating plants at Shawinigan Falls, Quebec, and Toronto, Ontario, and a new plant for the production of aluminium products has been constructed by the company at Kingston, Ontario. Data relating to the aluminium industry are not included with those recorded in tables of this report. Bauxite from British Guiana, used for the production of aluminium, is washed and dried before being shipped; at Arvida, Quebec, it is treated by a standard chemical process to remove impurities, and pure aluminium oxide is recovered. Cryolite, necessary in the production of the metal, is largely imported from Greenland; synthetic cryolite is also used in making aluminium. A very large amount of electrical energy is utilized in the production of new aluminium metal from bauxite concentrates. No bauxite ores are mined in Canada and the principal bauxite producing countries are—France, Hungary, United States, Yugoslavia, Italy, British Guiana, Dutch Guiana, and Russia.

A report issued by the United States Bureau of Mines contains the following information:—“Virgin aluminium production in the United States during 1939 was the largest on record. The 1939 peak output of new aluminium amounted to 327,090,000 pounds, valued at \$64,600,000. The large increase in demand for light but strong metal was caused by national preparations for defence and by the war abroad. In 1939 the aircraft industry consumed twice the amount of aluminium that it did in 1937, the previous record year. The Aluminum Company of America announced that there would be no increase in the basic ingot price of 20 cents per pound during the first quarter of 1940. War time needs caused the largest exportation of aluminium from the United States in history. Exports of crude and semi-crude aluminium totalled 74,169,742

pounds. The increasing demand for aluminium led the Aluminum Company of America to announce a \$30,000,000 expansion program to begin in 1940. The large consumption of aluminium in the aircraft industries has resulted in the installation of new production equipment and the accumulation of stocks of standard aircraft products."

Table 121.—Imports into Canada and Exports of Aluminium, Alumina, Bauxite and Cryolite, 1939

	Cwt.	\$
IMPORTS—		
Alumina.....	1,973	24,525
Bauxite ore.....	(a) 10,139,643	3,373,760
Cryolite.....	(b) 68,959	310,209
Aluminium angles, etc.....	1,460	59,810
Aluminium in pigs, ingots, blocks, notch bars, slabs, billets and blooms.....	3,788	90,049
Aluminium scrap.....	2,081	17,844
Aluminium in bars, rods and wire.....	6,464	251,900
Aluminium in plates, sheets and strips, including circles.....	15,232	537,373
Aluminium pipes and tubes.....	728	52,283
Aluminium leaf, less than .005 mm. thick.....		2,070
Aluminium kitchen or household hollowware, n.o.p.....		116,965
Aluminium, manufactures of, n.o.p.....		858,603
Aluminium leaf, n.o.p., or foil less than .005 inch thick, plain or embossed.....		150,877
Aluminium powder..... lb.	267,568	98,120
Other.....		5,809
Total—Aluminium and Its Products.....		5,950,197
EXPORTS—		
Aluminium scrap.....	21,770	265,038
Aluminium in bars, blocks, etc.—		
To—United Kingdom.....	779,155	14,328,385
United States.....	39,685	547,337
Brazil.....	12,935	220,543
China.....	23,764	433,025
Australia.....	8,638	147,409
Japan.....	420,837	7,801,052
Germany.....	57,964	848,315
British India.....	3,531	63,249
Belgium.....		
Mexico.....	63	1,683
Switzerland.....	1,874	34,921
Russia.....		
Other countries.....	63,133	1,258,557
Total—in bars, blocks, etc.....	1,411,579	25,684,476
Aluminium kitchen utensils and hollowware.....		12,838
Aluminium wire and cable.....		242,010
Aluminium, manufactures of, n.o.p.....		223,824
Total—Aluminium and Its Products.....		26,428,186

Imports of alumina into Canada in 1918 totalled 186,442,200 pounds valued at \$2,071,060 compared with 30,704,200 pounds at \$614,713 in 1913.

(a) 1,205,783 cwt. from the United States and 8,933,490 cwt. from British Guiana.

(b) 62,720 cwt. from Greenland.

Table 122.—Consumption of Aluminium in Specified Canadian Industries, 1938 and 1939

Industry	1938		1939	
	Pounds	Cost at works	Pounds	Cost at works
		\$		\$
Aluminium products (a).....	20,590,000	3,741,609	20,444,000	4,070,400
White metal alloys*.....	1,272,702	288,751	1,516,717	311,295
Electrical apparatus and supplies.....	1,660,763	472,301	1,873,516	619,155
Brass and copper products (b).....	2,020,349	277,472	1,656,605	272,609
Iron and steel products (b) (c).....	2,405,313	706,025	3,500,581	824,194

(a) Largely for the manufacture of cooking utensils, cable, etc.

* In addition in 1938 there were consumed 1,630,334 pounds of scrap valued at \$211,922, and in 1939, 2,539,707 pounds at \$322,987.

(b) Includes scrap.

(c) Includes industries manufacturing cooking and heating apparatus, sheet metal products, etc.

Table 123.—Estimated World Production of Aluminium, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	19,000	23,000	.....	—concluded			
Canada.....	41,000	65,000	74,000	Norway (c).....	22,679	28,576	31,000
Total.....	60,000	88,000	74,000	Spain.....	.....	600	.....
FOREIGN COUNTRIES				Sweden (c).....	2,248	2,380	.....
Austria.....	4,300	4,000	.....	Switzerland.....	23,500	28,000	28,000
France.....	33,932	44,600	50,000	U.S.S.R.....	45,000	50,000	.....
Germany (c).....	125,208	159,000	.....	Yugoslavia.....	200	(c) 1,191	.....
Hungary.....	1,000	1,500	1,500	United States (c) (b).....	130,661	128,072	146,022
Italy (c).....	22,585	25,360	30,000	Japan.....	10,500	20,000	23,000
				Total.....	422,000	493,000	310,000
				World's Total.....	482,000	581,000	384,000

(b) Secondary metal was recovered as follows:—

1936.....	46,000 long tons
1937.....	55,860 "
1938.....	34,640 "

(c) Official figures.

Table 124.—World Production of Bauxite, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
British Guiana—(c)				—concluded			
60% or more alumina.....	288,701	447,370	470,147	Greece.....	135,242	177,045	.....
50-60% alumina.....	7,817	.....	.....	Hungary.....	524,243	532,177	.....
30-50% alumina (b).....	64,413	115,646	81,622	Italy.....	380,391	355,138	.....
Unfederated Malay States.....	19,000	55,081	92,256	Roumania.....	10,531	11,620	10,604
India.....	15,150	14,768	.....	U.S.S.R. (estimated).....	250,000	250,000	.....
Australia.....	7,766	1,320	.....	Yugoslavia.....	352,167	398,180	313,804
Total.....	403,000	634,000	644,000	Mozambique.....	(a)	(a)	180
FOREIGN COUNTRIES				United States.....	425,076	310,916	375,307
Austria (estimated).....	3,000	5,000	.....	Brazil (Exports).....	8,631	12,724	17,990
Czecho-Slovakia.....	833	(a)	.....	Dutch Guiana.....	386,249	371,633	450,055
France.....	677,300	671,662	.....	French Indo-China.....	7,000	160	.....
Germany.....	18,000	19,100	.....	Netherland East Indies.....	195,828	241,479	227,025
				Total.....	3,370,000	3,320,000	1,395,000
				World's Total.....	3,770,000	3,950,000	2,039,000

(a) Information not available.

(b) Ore remains at the mines.

(c) The shipments from mines of dried and washed ore were as follows (long tons):—

	1937	1938	1939
Metallurgical.....	241,932	321,912	436,015
Chemical.....	48,950	46,275	39,138
Refractory.....	7,295	1,814	855
Abrasive.....	.....	2,596	5

PRODUCTION (EXPORTS) OF CRYOLITE IN GREENLAND

Year	Long tons
1937.....	50,822
1938.....	49,463
1939.....	(a)

ANTIMONY

Canadian production of virgin antimony during 1939 totalled 1,225,585 pounds valued at \$151,469. Of this the major part represents antimony metal recovered in the metallurgical plants of the Consolidated Mining and Smelting Company of Canada Limited, located at Trail, British Columbia. In addition there were relatively small quantities contained in ores exported from Nova Scotia and British Columbia. Prior to the close of 1938 there had been no commercial production of antimony metal in Canada since 1917 and no by-product output of the metal since 1926, in which year it was reported as contained in silver-lead-bismuth bullion produced from cobalt-silver ores mined in Northern Ontario.

Minerals containing antimony occur in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, and the Yukon Territory. Stibnite (Sb_2S_3) occurs in the veins of the Reliance Gold Mines, Bridge River mining district, British Columbia, and in the same province at the property of the Gray Rock Mining Syndicate in the Truax Creek area, and at the Congress mine adjoining the Reliance property. Statistics of production relating to antimony output in British Columbia in 1939 include the metal contained in stibnite ore shipped from the "Snowbird group" located at Stuart Lake near Fort St. James. This ore was exported to a smelter at Laredo, Texas, U.S.A. Antimony production in Nova Scotia in 1939 represents the metal contained in auriferous ore exported from old dumps accumulated at a West Gore property. An antimony reduction plant was built by the Consolidated Mining and Smelting Company of Canada, Limited at Trail, British Columbia, to work up an accumulation of antimony arsenic flue dust.

At the close of 1939 antimony metal was quoted—New York—14 cents per pound. Antimony ore, per unit of antimony contained, 50 to 55 per cent, \$1.50 to \$1.60; 58 to 60 per cent, \$1.60 to \$1.70; 60 to 65 per cent, \$1.80 to \$1.90; London, 60 to 65 per cent, 10s. 6d. per long ton unit, nominal.

Table 125.—Antimony Used in Specified Canadian Industries, 1938 and 1939

Industry	1938		1939	
	Pounds	\$	Pounds	\$
White metal alloys.....	(x) 514,027	68,962	671,118	70,855
Electrical apparatus and supplies.....	76,149	10,997	140,786	18,641

(x) Regulus. In addition the industry reported the consumption of 114,143 pounds of antimony ore valued at \$5,407 in 1939 and 145,440 pounds at \$7,575 in 1938.

Table 126.—Imports of Antimony and Antimony Products into Canada, 1938 and 1939

	1938		1939	
	Pounds	\$	Pounds	\$
Antimony or regulus of, not ground, pulverized or otherwise treated...	856,986	85,461	238,909	27,092
Antimony oxide and titanium oxide (x).....	5,710,481	512,219	9,003,693	803,198
Antimony salts—tartar emetic, etc.....	62,016	9,376	27,755	7,283
Antimony salts for dyeing.....	25	23	537	97
Type metal in blocks, bars, plates and sheets.....	540,959	20,746	647	5,027

(x) Including white pigments containing not less than 14 per cent by weight of titanium.

Imports of antimony or regulus of into Canada during 1917 totalled 332,137 pounds valued at \$61,732 compared with 1,962,194 pounds at \$344,918 in 1915; 667,050 pounds at \$49,408 in 1913 and 683,803 pounds at \$111,664 in 1918.

Table 127.—World Production of Antimony Ore, 1937, 1938 and 1939

(In terms of metal)

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES —concluded			
Southern Rhodesia.....	78	77	61	Algeria.....	958	1,010	.....
Union of South Africa.....	.....	12	7	Morocco (French).....	26	155	.....
Canada.....	.....	11	547	Morocco (Spanish).....	206	80	.....
Burma (estimated).....	30	90	.....	Mexico.....	10,471	7,907	7,749
India.....	(c)	13	.....	United States (b).....	1,130	580	351
Sarawak.....	5	.....	15	Argentina.....	10	210	117
Australia.....	567	(a)	.....	Bolivia (exports).....	7,014	9,287	9,896
FOREIGN COUNTRIES				Peru.....	(a)	(a)	.....
Austria.....	248	(a)	.....	Honduras.....	1,396	662	.....
Czecho-Slovakia.....	1,226	(a)	.....	China.....	15,000	8,000	7,000
Greece.....	.....	(a)	.....	French Indo-China.....	6	102	.....
Italy.....	600	910	.....	Japan.....	(a)	(a)	.....
Portugal.....	61	161	239	Korea.....	10	(a)	.....
Yugoslavia.....	1,780	3,370	3,700	Turkey.....	659	490	500

(a) Information not available.

(b) Secondary metal was recovered as follows:—

1936.....	8,800 long tons
1937.....	11,018 "
1938.....	7,590 "

(c) Included with 1938.

BARIUM

A report on barium minerals by the Imperial Institute, London, contains the following information:—"A series of lead-calcium-barium alloys known in some cases as Frary metal and others as Ferry metal, are used for bearing purposes. The amount of barium is about 2 per cent and the bulk of the alloy is lead. The alloys are manufactured electrolytically from molten chlorides using a cathode of molten lead, and are used in the same manner as other 'white' metals. Aluminium and barium form a series of alloys which have greater fluidity than pure aluminium. A range of barium-aluminium and barium-magnesium alloys are being produced by an English firm under the trade names 'Baral' and 'Barmag'. The proportion of barium varies up to as much as 50 per cent, but the consumers in the wireless valve trade usually require the 'Baral' alloy to contain 45 to 50 per cent of barium and the 'Barmag' alloy to carry 25 to 30 per cent barium. With nickel, barium forms an alloy (0.2 per cent barium) which is stated to exhibit greater resistance to the action of hot corrosive gases than does pure nickel, and on this account it has been used for the manufacture of sparking plug electrodes.

"The metal can be prepared by heating barium oxide (BaO) and peroxide (BaO_2) to 1350°C . in an electric furnace, with a metal having a high heat of oxidation, aluminium being suitable for this purpose. Barium is an extremely active deoxidizer, combines with many gases and in the radio industry is inserted, in the form of copper-clad wire, into valves (tubes) to remove the last traces of gas."

Barium has been produced in the United States, Germany, France and Great Britain, but not yet commercially in Canada. "Mineral Industry" reported in 1936 that the price of barium has been continuously reduced and it is probably now available at \$5.00 per pound or less.

BERYLLIUM

The principal ore of beryllium is the mineral beryl— $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$. There are several known occurrences of this mineral in Canada and shipments of beryl have been made for experimental purposes from deposits in Renfrew county, Ontario, and the Oiseau river area in Manitoba. Beryl usually occurs in pegmatites and is sometimes recovered as a by-product in the mining of the feldspar and mica content of these rocks. No commercial production of beryl has ever been officially reported in Canada, however, in 1938, Canadian Beryllium Mines and Alloys Limited, conducted development work on beryl-feldspar deposits located in Renfrew County, Ontario.

It was reported that the company had some 206 tons of beryllium ore available for treatment at the close of 1939. No commercial production of beryllium ore in Canada was reported in 1939. The metal beryllium is used chiefly in the manufacture of copper-beryllium alloys. During recent years the production of beryllium in the United States came from plants operated by the Beryllium Corporation of Pennsylvania, Temple, Pennsylvania, and the Brush Beryllium Corporation, 3714 Chester Avenue, Cleveland, Ohio. In 1938 it was reported that about one ton of beryllium worth 3,000 francs per kilogram (about \$40 a pound) was being produced annually in France by electrolysis in a fluoride bath from beryl obtained near Limoges and Autun, supplemented by supplies from Madagascar; Italy, Japan and possibly other countries are credited with small or occasional outputs, but Germany and the United States produce the bulk of the world's beryllium in the form of alloys. United States output of beryl has been mainly as a by-product of feldspar, lithium or rare metal mining. An interesting new development is the use of beryllium-copper in cast-setting diamond core bits and reaming shells.

Engineering and Mining Journal, New York, at the close of 1939 quoted beryllium-copper, master alloy 4 per cent beryllium, remainder copper, in lots one pound or more of beryllium, \$15 per pound of contained beryllium. Beryllium ore—per ton (2,000 pounds), carload lots, minimum 10 per cent BeO, \$30; minimum 12 per cent, \$35 F.O.B.

No imports into Canada of beryllium, described as such, were reported in 1939. It may, however, enter in the form of special alloys.

BISMUTH

Bismuth production in Canada during recent years represented the metal recovered from silver-lead ores smelted at Trail, British Columbia, and the metal contained in silver-lead-bismuth bullion produced in the treatment of silver-cobalt ores at Deloro, Ontario. Production in 1939 came entirely from the treatment of silver-lead ores in the Trail smelter and totalled 409,449 pounds valued at \$466,362. The total output of bismuth in the Dominion to the close of 1939 amounted to 1,531,752 pounds worth \$1,775,768. The largest previous annual production occurred in 1936 in which year 364,165 pounds valued at \$360,523 were recovered.

Imports of metallic bismuth into Canada in 1939 totalled 10,252 pounds valued at \$10,835 compared with 297 pounds at \$303 in 1938; these imports came entirely from the United States. Imports of bismuth salts in Canada in 1939 were appraised at \$8,671 compared with \$16,756 in the preceding year.

Bismuth is consumed chiefly in the manufacture of pharmaceuticals and alloys. According to the United States Bureau of Mines report, pharmaceutical and medicinal manufacturers have heretofore used about 75 per cent and low-melting-point and non-shrinking alloys the balance. The metal is employed in almost all low-melting metallic alloys used for fusible plugs, safety devices, dental models, soft solders and tempering baths for small tools and pieces. The principal alloying components used with bismuth are lead, tin and cadmium. The recently developed free-cutting aluminium alloy 11S contains a small percentage of bismuth. Bismuth also is used in small quantities in iron castings, in special brake linings, in enamelling and the manufacture of optical glass, in the manufacture of special instruments, and in plastics as bismuth subnitrate. "Metal and Mineral Markets", New York, quoted bismuth metal, September, 1939—per pound, in ton lots \$1.10; London 4s. 6d.

Table 128.—Production* of Bismuth in Canada, 1930-1939

Year	Pounds	\$	Year	Pounds	\$
1930.....	12,732	6,366	1935.....	13,797	13,245
1931.....	118,207	157,650	1936.....	364,165	360,523
1932.....	16,855	7,340	1937.....	5,711	5,654
1933.....	78,303	81,526	1938.....	9,516	9,754
1934.....	253,644	301,215	1939.....	409,449	466,362

* First commercial production in 1924.

† High record output.

Table 129.—Bismuth Used in the Manufacture of Canadian Medicinal and Pharmaceutical Preparations, 1938-1939

Item	1938		1939	
	Pounds	\$	Pounds	\$
Bismuth metal.....	26,643	23,951	18,155	16,821
Bismuth salts.....	12,779	19,107	13,430	21,815

Table 130.—World Production of Bismuth Ore, Etc.,* 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Cwt.)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
Uganda—				Norway—			
Ore.....		8		Copper ore (<i>Bi content</i>)....	7	5	
Union of South Africa—				Roumania—			
Ore (<i>Bi content</i>).....	368	52	27	Bismuth-Molybdenum ore	530	3,150	18,700
Canada—				Mexico—			
Metal and content of bul-				Ore (<i>Bi content</i>).....	2,789	3,657	3,222
lion.....	51	85	3,656	Argentina—			
Burma—				Ore (<i>Bi content</i>).....	160	(a)	60
Ore.....	2			Bolivia (exports)—			
Australia—				Ore, etc. (<i>Bi content</i>).....	607	538	260
Ore, etc.....	174	132		Peru—			
FOREIGN COUNTRIES				Lead-silver bullion, etc.			
France—				(<i>Bi content</i>).....	357	259	8,617
Mispickel (<i>Bi content</i>)....		(a)		Metal.....	1,318	3,975	
Metal.....		180		Japan—			
				Metal.....	(a)	(a)	

* Bismuth ore is also produced in Germany, Spain and China and the metal recovered as a by-product in the United Kingdom, Sweden, U.S.S.R. and the United States.

(a) Information not available. (b) Exports.

BORON

According to the United States Bureau of Mines, boron alloys are supplied by United States manufacturers, small quantities being used in the nonferrous-metals industries and in steel making. In cast iron, boron opposes graphitization on solidification and exerts an energetic whitening effect, producing a hard strong iron but reducing malleability.

Boron carbide, boron carbide shapes and calcium boride are now produced in Canada.

CADMIUM

Cadmium production in Canada represents the recovery of the metal as a by-product in the electrolytic refining of zinc. Production up to 1935 came entirely from the treatment of zinc-bearing ores at Trail, British Columbia, by the Consolidated Mining and Smelting Company of Canada, Limited. The commercial production of the metal from the copper-gold-silver-zinc ores of the Flin Flon mine was commenced in Manitoba for the first time in 1936.

The output of cadmium in the Dominion in 1939 totalled 939,691 pounds valued at \$662,209, compared with 699,138 pounds at \$561,799 in 1938; the quantity of the 1939 production was an all-time high record in Canadian production of the metal; of the 1939 production, 799,253 pounds valued at \$563,241 were credited to British Columbia, 73,830 pounds at \$52,029 to Manitoba, and 66,608 pounds at \$46,939 to Saskatchewan. The proportioning between Manitoba and Saskatchewan of the cadmium recovered by the Hudson Bay Mining & Smelting Company results from the interprovincial boundary intersecting the orebody of the Flin Flon mine.

German cadmium production in 1939 was probably well over 400 tons according to the "Mining Journal," London. Italian production should have been of the order of 100 tons in 1939.

Cadmium is consumed largely in the manufacture of alloys and for plating, also in the making of such pigments as cadmium lithopone, cadmium yellows, etc. A relatively large quantity of the metal is used in the production of bearing metals for high-speed internal combustion engines. It was reported after the outbreak of war in September that both the demand and market price of cadmium showed a decided increase. "Metal and Mineral Markets", New York, quoted cadmium December, 1939, per pound, commercial sticks, wholesale quantities, 75 cents, London 5s. 6d.

Table 131.—Cadmium Production in Canada, 1928-1939

Year	British Columbia		Manitoba		Saskatchewan	
	Pounds	\$	Pounds	\$	Pounds	\$
1928*	491,894	341,374				
1929	773,976	675,294				
1930	456,582	337,871				
1931	323,139	180,958				
1932	65,425	26,824				
1933	246,041	78,733				
1934	293,611	95,665				
1935	580,530	441,203				
1936	526,034	468,170	148,133	131,838	111,749	99,457
1937	436,431	715,747	164,223	269,326	144,553	237,067
1938	510,342	410,090	115,166	92,543	73,630	59,166
1939	799,253	563,241	73,830	52,029	66,608	46,939

* First production.

In 1937 there were 65,796 pounds of cadmium valued at \$84,993 used in the Canadian white metal alloys industry; the consumption of the metal in the same industry during 1938 was 48,939 pounds, worth \$41,561, and in 1939 it was 76,072 pounds worth \$49,722.

Table 132.—World Production of Cadmium, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Lb. avdp.)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—con.			
United Kingdom.....	273,688	275,354	.....	Germany.....	783,000	957,000	.....
South West Africa (d).....	305,000	255,000	.....	Italy.....	200,000	152,000	.....
Canada.....	745,207	699,138	939,691	Norway.....	339,935	458,000	.....
Australia.....	464,311	439,436	.....	Poland.....	274,000	538,000	.....
FOREIGN COUNTRIES				U.S.S.R. (a)	(a)	(a)	(a)
Belgium.....	598,000	400,000	.....	United States—			
France.....	218,000	265,000	.....	Metal.....	3,995,739	3,753,323	4,141,242
				Compounds (metal content).....	828,000	431,000	679,000
				Mexico (b).....	1,366,407	1,680,800	1,800,259

Cadmium is also produced in the Netherlands, Sweden and Japan.

(a) Information not available.

(b) Including cadmium content of flue dust, etc., exported for treatment.

(d) Estimated cadmium content of shipments of dust to Germany.

CALCIUM

There is no commercial production of calcium metal in Canada and data relating to possible imports of metallic calcium into the Dominion are not published. The following information relating to the metal is supplied by "The Mining Journal", London:—"Calcium metal alloys with aluminium, magnesium, beryllium, barium, copper, iron and lead, and the alloys are used both for general and special purposes. The metal is very useful as a reducing agent in the preparation of different metallic products and effects a great improvement in the properties of certain alloys. It also acts as a reducing agent in the preparation of metal powders of chromium, thorium and uranium. In the form of calcium silicide it is a good de-oxidizer in iron castings and alloyed with lead it is used in battery grids and plates, for machinery and other bearings, and as a sheathing for telephone, cable and electric lines. During the war of 1914-18, when antimony and antimonial lead were difficult to obtain in the United States, the so-called 'Frary' metals were developed containing, besides lead, two per cent barium and one per cent calcium. These alloys found

considerable favour for bearings, and in some respects, such as, tensile strength, hardness and resistance to fatigue, were considered superior to the one per cent antimony lead, when used for cable sheathing. These alloys can be satisfactorily cast, rolled, welded, machined and turned. From the results of experience available, it would seem that amongst the most valuable functions of calcium metal is that of the great scavenging effect in freeing other metallic products from impurities which might be highly detrimental to their employment.

"Calcium metal, either as such, or in alloy form, has uses outside the metallurgical field. It is used to dehydrate commercial alcohol to obtain 100 per cent spirit and also for the dehydration of certain solvents and organic liquids; also for de-sulphurizing petroleum fractions; it is also a very effective absorbing agent for producing high vacua.

"Calcium metal is produced by the electrolysis of fused calcium chloride, at an expenditure of electric energy of 15 to 25 kilowatt hours per pound of metal produced. The pure metal is silver-white, but when exposed to moisture-containing air, a film of bluish oxide forms on its surface, which film is protective against further atmospheric action. The metal has a specific gravity of 1.542 and thus is lighter than beryllium, magnesium and aluminium, being only exceeded in lightness by the alkali metals. Incidentally, this property of lightness is not of great importance, because calcium metal as such is not likely to be used extensively for constructional purposes, but only in small quantities alloyed with other metals. The metal is ductile and malleable and can be machined, turned, etc., but cannot be cast by ordinary foundry methods—calcium is rapidly becoming an important metallurgical raw material which suggests that its production will continue to increase with the usual result of lowering the market price".

Calcium metal was quoted in the United States, September, 1939—per pound 98 to 99 per cent—75 cents—ton lots, lump. Data relating to possible Canadian imports of calcium metal are not published.

CHROMITE

The mineral chromite (FeO , Cr_2O_3) is the commercial source of the metal chromium; it is also used extensively in the manufacture of refractory brick. The metal is a necessary constituent of many high-speed cutting tools, certain armour plate, and stainless steels. Chromite is also used in the manufacture of chromic acid for electroplating and in the manufacture of chemicals used chiefly in the dyeing, tanning and pigment industries.

The principal chromite producing countries are Russia, South Africa, Turkey, Southern Rhodesia, Cuba, New Caledonia, Yugoslavia, India, and Philippine Islands. Production of the mineral in Canada during recent years has been relatively small, coming almost entirely from the Eastern Townships, Quebec. During the past few years considerable development work was conducted on a chromite deposit located at Obongo Lake, in the Thunder Bay district of Ontario; shipments were made from this property in 1935, 1936 and 1937. The owners of this mine, The Chromium Mining and Smelting Corp. Ltd., also have a modern electric smelting plant at Sault Ste. Marie, Ontario, for the production of ferro-chrome and ferro-silicon. No commercial shipments of ore were made from the Obongo Lake property during 1939 and it was reported that the company, in the future, would smelt only imported chromite ore. In 1939 development work was conducted on a chromite prospect located in Coleraine Township, Megantic County, Province of Quebec; some fifteen tons of ore were extracted during the year, but no shipments were recorded.

In British Columbia, exploration and development work has been conducted during the past on several chromite deposits but there have been no reports made to the Dominion Bureau of Statistics, Ottawa, of recent activities at these properties with the exception of some surveying completed in 1937 by the Consolidated Mining and Smelting Company of Canada, Limited, at chromite claims located near Ashcroft.

"Metal and Mineral Markets", New York, quoted chrome ore September, 1939, as follows:—Per long ton C.I.F. Atlantic ports: 43 to 45 per cent Cr_2O_3 , \$20.00 to \$22.00; 48 to 50 per cent, \$25.00 to \$26.00. Prices nominal. Corresponding prices May, 1940 were:—Turkish, 48 per cent Cr_2O_3 concentrate, \$29.00 to \$30.00; Indian, 48 per cent, \$25.00 to \$26.00; 43 to 45 per cent refractory, \$21.00 to \$22.00.

The production of chromite in the Eastern townships of the Province of Quebec was greatly stimulated during the world war of 1914-1918 by the demand created for the mineral as a refractory and in the manufacture of ferro-chrome. From 1910 to 1914 inclusive, the Canadian industry had

been dormant, but in 1915 shipments of 12,341 tons averaging less than 35 per cent Cr_2O_3 were made. This was increased in 1916 to 15,249 tons valued at \$310,902 (final shipments of ore and custom concentrates) having an average content of 38.3 per cent Cr_2O_3 and an average value of \$20.39 per ton. In 1917 the final shipments of ores and concentrates were 23,712 tons valued at \$581,796 containing an average of about 35.7 per cent Cr_2O_3 . The 1917 shipments included 20,154 tons of ore that would vary from 30 per cent to 40 per cent Cr_2O_3 , but would probably average close to 32 per cent; and 3,558 tons of concentrates that would average about 50 per cent Cr_2O_3 .

Of the total shipments in 1917 about 965 tons were marketed for consumption in Canada. Prices for 40 per cent chromite ore varied during 1917 from 85 cents per unit, per short ton in January to a maximum of \$1.25 per unit in December. Exports of chromite from Canada in 1918 were 15,831 tons valued at \$353,616; the imports of bichromate of soda into Canada in 1918 were 1,046,490 pounds valued at \$208,669; data relating to imports of ferro-chrome into Canada in 1918 are not available.

Table 133.—Production of Chromite in Canada, 1928-1939

Year	Short tons	\$	Year	Short tons	\$
1928.....			1934.....	111	1,578
1929.....	126	900	1935.....	1,144	14,947
1930.....			1936.....	(a)	13,578
1931.....			1937.....	(a)	43,250
1932.....	78	1,113	1938.....		
1933.....	30	343	1939.....		

(a) Quantity not published.

Production in 1918 was 21,994 tons valued at \$867,122; of this output 670 tons valued at \$36,395 came from Cascade in the Rossland district, British Columbia, and the balance from Quebec province.

Table 134.—Imports of Chromium and Chromium Products into Canada, 1938 and 1939

	1938		1939	
	Quantity	\$	Quantity	\$
Chromium metal and tungsten metal, in lumps, etc., when imported by manufacturers for alloying purposes.....lb.	43,527	30,328	55,428	50,769
Nickel chromium in bars or rods not more than 0.75 inches diam., containing 60 per cent nickel and 10 per cent chromium for use as electric resistance wire, etc.....lb.	43,472	41,805	48,597	48,616
Chrome firebrick.....		47,885		88,367
Bichromate of potash—crude.....lb.	121,531	10,435	188,479	16,819
Bichromate of soda.....lb.	1,776,372	106,150	3,246,413	211,173
Chrome ore and ores of metals, n.o.p.*.....lb.	19,137,700	378,496		
Chrome ore (a).....lb.	18,206,600	142,399	33,168,400	232,851

* To March 31, 1938.

(a) From April 1st, 1938; 16,464,000 pounds at \$123,100 from British South Africa in 1938 and 26,626,100 pounds in 1939.

Table 135.—Consumption of Certain Chromium Products and Chrome Ore in Specified Canadian Industries, 1938 and 1939

Industry	Item	1938		1939	
		Pounds	\$	Pounds	\$
Ingots and Castings.....	Chrome ore.....	504,000	8,440	3,747,520	53,961
Ingots and Castings.....	Ferrochrome.....	1,478,000	116,639	2,228,800	175,759
Paints, Pigments and Varnishes.....	Chrome colours.....	1,425,687	215,524	1,592,092	252,100
Paints, Pigments and Varnishes.....	Sodium bichromate.....	490,607	34,837	624,675	43,044
Leather Tanning.....	Sodium bichromate.....	1,482,653	115,227	625,997	14,569
Glass Manufacture.....	Chromite.....	68,000	1,461	20,000	491

NOTE.—In addition to the items listed above, a considerable quantity of chromite is utilized in the manufacture of Canadian ferro-alloys, also a relatively small quantity of sodium bichromate is consumed in the chemical industry. Chromite is also employed in Canada in the manufacture of refractories.

Table 136.—World Production of Chrome Ore, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939
BRITISH EMPIRE			
United Kingdom.....	300	466	.....
Sierra Leone.....	(d) 729	1,300	.....
Southern Rhodesia.....	271,265	183,083	136,887
Union of South Africa.....	165,958	173,773	157,488
Cyprus.....	1,615	5,577	7,678
Canada.....	3,814	.....	.....
India.....	62,307	44,149	.....
Australia.....	459	952	.....
Total.....	506,000	408,000	302,000
FOREIGN COUNTRIES			
Bulgaria.....	2,313	1,717	.....
Greece (b).....	51,789	41,793	.....
Italy (Rhode Is.).....	(a)	(a)	.....
Norway.....	173	500	.....
U.S.S.R. (c).....	(a)	(a)	.....
Yugoslavia.....	58,918	49,401	44,144
Cuba.....	79,420	36,739	51,869
Guatemala.....	.....	483	890
United States.....	2,321	812	3,614
Brazil (exports).....	837	920	3,695
Japan.....	(a)	(a)	.....
Philippine Islands.....	75,209	38,271	71,914
Turkey.....	189,468	210,256	180,390
New Caledonia.....	47,264	51,391	.....
Total.....	(a)	(a)	356,000
World's Total.....	(a)	(a)	.....

(a) Information not available.

(b) Figures for 1938 refer to exports.

(c) Probably includes some ore needing concentration.

(d) Shipments.

IRON ORE

No iron ores, known as such, were mined in Canada for some years prior to 1939. Nova Scotia with its large iron and steel industry is not a producer of iron ore. The large deposits of high grade ore in Newfoundland, owned by the Dominion Steel and Coal Corporation, are much more readily accessible and of a higher and more constant grade than the iron ore deposits in Nova Scotia.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time until 1883, the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and Drummondville, the last to shut down being the Drummondville furnace in 1911. At the present time only titaniferous ore is mined in Quebec; this ore is produced near Baie St. Paul and is shipped for its titanium content.

In the Province of Quebec exploration of iron ore deposits, located near the Labrador border, was conducted by McKay Exploration Limited during the period June 4 to September 13, 1939.

More iron ore has been produced in Ontario than in any other province; in northwestern Ontario, about 1899, a deposit of hematite, that later developed into the Helen mine, was found. This property was the main source of Ontario's iron ore output for a number of years. The province has a large supply of low-grade iron ore, but beneficiation processes must be applied to make these ores suitable for commercial use.

During 1937 the Algoma Ore Properties Limited, commenced rebuilding the surface equipment at the New Helen iron mine in Michipicoten; work was suspended in May, 1938, and resumed in December; development operations were continued in 1939 and commercial shipments of beneficiated ore were commenced in July. These totalled 123,598 short tons valued at \$341,594 in 1939. The Dwight-Lloyd process for the elimination of CO₂ and sulphur is employed in the

treatment of the Helen mine ore. A new discovery of hematite iron ore at Steep Rock Lake near Atikokan, Ontario, the first of bessemer grade ever found in Ontario, was reported in March of 1938. This deposit, which might prove of extreme importance to the industrial life of the province and to Canada generally, has been outlined by diamond-drilling on behalf of the Sterola Exploration Company. Early drilling indicated a mass of ore at least 700 feet long and 150 wide. This grade of hematite ore requires no beneficiation prior to smelting. Exploration and development of the deposit were continued in 1939.

Legislation passed by the Ontario Legislature has provided that a bounty of two cents per unit of iron will be paid to possible producers of iron ores for a period of ten years, commencing January 1, 1939.

Different varieties of iron ore are found in various parts of British Columbia, the most important of which are the magnetite deposits which occur on the islands along the coast.

Imports of iron ore into Canada during 1939 totalled 1,764,844 tons valued at \$4,179,353 compared with 1,302,430 tons at \$2,830,482 in 1938; of the 1939 imports 1,205,261 tons valued at \$3,080,641 came from the United States; 524,849 tons at \$938,954 from Newfoundland and 20,404 tons at \$73,061 from Brazil.

Iron ore quotations in the United States, August, 1939, were as follows:—per long ton, Lower Lake Ports, Lake Superior Ore—Mesabi, non-bessemer, 51½ per cent iron \$4.95. Old range, non-bessemer, \$5.10. Mesabi, bessemer, 51½ per cent iron \$5.10. Eastern ores, cents, per long ton unit, delivered at furnaces: Foundry and Basic, 56 to 63 per cent, 9 to 9½ cents. April, 1940, quotation for Mesabi, non-bessemer, 51½ per cent iron, \$4.45. Old range, non-bessemer, \$4.60. Mesabi, bessemer, 51½ per cent iron, \$4.60. Old range, bessemer, \$4.75.

The Foreign Minerals Quarterly of the United States Department of the Interior shows a total of 21,927,539 metric tons of iron ore imported into Germany in 1938 of which 755,454 came from Algeria; 1,718,049 from Belgium-Luxemburg; 5,056,121 from France; 1,121,515 from Newfoundland; 1,082,551 from Spain; 724,549 from Spanish Morocco; 8,992,331 from Sweden and 2,476,969 from other countries.

Table 137.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1930-1939

Year	To Nova Scotia	To United States	To Europe	Total Ship- ments
	Short tons	Short tons	Short tons	Short tons
1930*	523,918	54,623	740,774	1,319,315
1931	234,148	25,670	530,079	789,897
1932*			166,303	166,303
1933			254,383	254,383
1934*	346,178		344,769	690,947
1935	611,581		81,123	692,704
1936	527,540	12,656	252,676	792,872
1937	702,714	50,490	1,242,088	1,995,292
1938	555,348		1,305,068	1,860,416
1939	576,198	16,184	980,098	1,572,480

* Shipments to Europe in 1930, 1932 and 1934 were to Germany only, while from 1935 to 1938 shipments went to both Germany and Great Britain. Shipments to Germany in 1938 totalled 1,256,230 short tons, and in 1939, 768,743 tons.

Table 138.—Imports into Canada and Exports of Iron Ore, 1939

	Quantity	Value
	Short tons	\$
IMPORT,—		
Iron ore from the United States.....	1,205,261	3,080,641
Iron ore from Newfoundland.....	524,849	938,954
Iron ore from other countries.....	34,734	159,758
Total.....	1,764,844	4,179,353
EXPORTS—Total.....	10,540	42,767

Table 139.—World Production of Iron Ore, 1937, 1938 and 1939

(Including Manganiferous Iron Ore)

(Supplied by *Imperial Institute*)

(Long tons)

Producing Country	Ore		
	1937	1938	1939
BRITISH EMPIRE			
Canada.....			110,355
United Kingdom (b).....	14,214,995	11,859,191	136
Northern Rhodesia.....	520	205	
Sierra Leone (shipments).....	633,955	861,955	
South West Africa.....	14,054	23,484	19,192
Union of South Africa.....	454,505	497,336	482,397
Newfoundland.....	1,609,718	1,680,213	1,600,761
Burma.....	25,426	18,059	
India.....	2,870,832	2,743,675	
Federated Malay States.....	1,147	923	768
Unfederated Malay States.....	1,660,342	1,580,915	1,941,753
Australia.....	1,871,631	2,250,491	
New Zealand.....	571	1,218	1,586
Total.....	23,360,000	21,520,000	4,156,000
FOREIGN COUNTRIES			
Austria.....	1,854,927	2,605,000	
Belgium.....	261,415	178,063	
Bulgaria.....	11,732	16,506	
Czecho-Slovakia.....	(a)		
France.....	1,807,490		
Germany.....	37,252,386	32,904,045	
Greece.....	9,636,974	10,942,200	
Hungary.....	295,752	343,107	
Italy.....	285,403	364,091	
Luxemburg.....	1,000,219	989,829	
Norway.....	7,643,597	5,059,443	
Poland.....	992,301	1,402,786	
Portugal.....	767,830	858,369	
Roumania.....	7,578	(a)	54
Spain.....	127,022	136,987	140,759
Sweden.....	975,132	2,474,125	
Switzerland (estimated).....	14,711,555	13,701,955	
U.S.S.R. (d).....	70,000	150,000	
Yugoslavia.....	26,000,000	27,000,000	
Algeria.....	609,713	597,523	656,285
Morocco (French).....	2,386,927	2,985,582	
Morocco (Spanish).....	65,744	265,547	
Tunis.....	1,402,231	1,320,468	
Cuba (shipments).....	928,858	809,070	
Mexico.....	488,420	152,099	161,523
United States (c).....	133,869	97,782	139,102
Brazil.....	73,434,520	28,756,142	52,540,000
Chile.....	182,708	362,690	390,669
French Indo-China.....	1,505,542	1,581,670	1,599,948
Japan.....	32,764	128,240	
Korea.....	(a)	(a)	
Manchuria.....	204,200	(a)	
Philippine Islands.....	(a)	(a)	
Turkey.....	681,698	856,310	
New Caledonia.....		19,980	141,014
		35,707	
Total.....	190,000,000	144,000,000	55,769,000
World's Total.....	213,000,000	165,000,000	

(a) Information not available.

(b) In addition, bog ore and iron ore (not used for smelting) were produced as follows:—

1937.....8,243 long tons

1938.....6,454 long tons.

(c) Including shipments of manganiferous iron ore up to 35 per cent Mn.

(d) Estimated for 1937 and 1938.

IRON AND STEEL AND THEIR PRODUCTS

The Primary Iron and Steel Industry

Statistics for the Primary Iron and Steel Industry include data for all establishments in Canada which were engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (c) steel ingots and steel castings, (d) hot rolled iron and steel products, (e) cold rolled or cold drawn steel bars, strips and shapes. Thirty-nine firms were included in this industry in 1939 and reports were received for 54 different plants or departments, including 4 blast furnace departments, 4 ferro-

alloy plants, 30 steel furnace divisions, and 16 rolling or drawing mills. Separate reports were received for blast furnace departments, steel furnace divisions and rolling mills even when they were really units of a single works.

Factory sales of pig iron, ferro-alloys, steel ingots and castings, and finished rolled products were 27 per cent higher in 1939 than in 1938, the values being \$75,934,481 and \$59,606,150, respectively. The 25 works in Ontario reported sales at \$48,925,939, or 64 per cent of the total for Canada; 6 plants in Nova Scotia accounted for \$15,223,484, or 20 per cent, and 14 works in Quebec for \$9,410,406, or 12 per cent. There were also 4 operating plants in Manitoba, 4 in British Columbia and 1 in Alberta.

Capital employed in 1939 amounted to \$113,660,251, including \$74,640,094 as the value of land, buildings and plant equipment, \$22,820,868 as the value of inventories of raw and finished materials on hand and in process, and \$16,199,289 as the total of operating capital, such as cash, bills and accounts receivable. For works in Ontario the capital was \$75,269,867; for Nova Scotia, \$22,015,230; for Quebec, \$14,358,351; for Manitoba, \$1,732,926, and for Alberta and British Columbia, \$283,877.

The average number of employees in 1939 was 13,827, an increase of 5 per cent from the 1938 average of 13,100. About 989 persons worked in blast furnace departments during the year, 440 in ferro-alloys plants, 4,551 in steel furnace divisions and 7,847 in rolling mills. About 62 per cent of the total or 8,594 were employed in Ontario, 2,473 in Quebec, 2,252 in Nova Scotia, 406 in Manitoba and 102 in British Columbia and Alberta.

Payments in salaries and wages amounted to \$20,410,517 in 1939, a gain of 12 per cent from the previous year's total of \$18,256,627. Salaries increased to \$3,003,672 from \$2,844,190 and wages to \$17,406,845 compared with \$15,412,437 in 1938.

Cost of materials for use in manufacturing processes was \$29,629,376 compared with \$24,786,761 in 1938, and the cost of fuel and electricity was \$6,174,661 against \$5,529,833; an increased expenditure, amounting to 20 per cent, was made for materials and 12 per cent for fuel and power.

PIG IRON

The output of pig iron in 1939 amounted to 755,731 tons, an increase of 7 per cent over the total in the previous year of 705,427 tons. Production of basic iron was given at 655,560 tons or about 87 per cent of the total; foundry iron amounted to 71,709 tons and the malleable grade to 28,462 tons.

Producers' sales of pig iron totalled 171,977 tons at \$3,757,573 in 1939 compared with sales of 129,565 tons at \$2,961,639 in 1938, a gain of 33 per cent in quantity and 27 per cent in value.

A review of the year's output by months shows that 57,660 tons were made in January after which the production fell off to the year's low in March at 40,723 tons, then advanced intermittently to around 65,000 tons in August and September, and closed the year at the high of 94,483 in December.

Charges to iron blast furnaces during the year included 1,272,800 tons of imported ore, 45,152 tons of Canadian ore, 106,834 tons of mill cinder, 775,869 short tons of coke, 259,431 short tons of imported limestone and 97,946 short tons of Canadian limestone.

Imports of pig iron during the calendar year declined to 587 tons from 2,122 tons while exports advanced slightly to 10,728 tons from 10,546 tons in 1938.

Producers' stocks at the end of 1939 were reduced to 61,763 tons compared with 127,909 tons in the preceding year.

The apparent consumption of pig iron in Canada, as calculated by deducting the exports from the sum of the production plus imports, amounted to 811,736 tons in 1939, the corresponding figure for the previous twelve-month period being 681,381 tons.

Producers of pig iron in Canada have 10 blast furnaces available for use, which, if operated at the rated capacity, could produce 1.5 million tons of pig iron a year. Actual production in 1939 at 755,731 tons was about 50 per cent of capacity. Only 8 of the blast furnaces were used during the year.

FERRO-ALLOYS

Production of ferro-alloys of all kinds in 1939 amounted to 76,375 tons, a gain of about 37 per cent over the 55,926 tons reported for 1938.

Ferro-alloys were made by 11 different concerns in Canada, 5 of whom recovered ferro-silicon as a by-product in the manufacture of abrasives, while the other six made various alloys as a primary part of their production.

Altogether ferro-silicon was made in 9 different plants, and spiegeleisen in two. Other alloys produced by one firm only included ferro-manganese, silico-manganese, silico-spiegeleisen, ferro-chrome, ferro-phosphorus, silicon metal and calcium silicon.

STEEL INGOTS AND CASTINGS

Steel production advanced 20 per cent to 1,384,870 tons in 1939 from 1,155,190 tons in the preceding year, the output of steel ingots advancing to 1,330,408 from 1,103,094 tons and steel castings to 54,462 tons from 52,096 tons. Factory sales of ingots and castings totalled 56,566 tons valued at \$9,169,097.

Thirty steel plants were in operation during the year. These plants had 87 furnaces, including 40 basic open hearth with an annual capacity of 1,774,946 tons, 44 electric furnaces rated at 279,076 tons and 3 converters at 2,600 tons. Of the 30 companies, 18 made electric castings only, 3, electric ingots only, 2, basic ingots only, 2, basic ingots and castings, 2, converter castings only, 1, basic and electric ingots also electric castings, 1, basic and electric castings and 1 made electric and converter castings.

Operating steel furnaces in 1939 used 654,550 tons of pig iron, 827,695 tons of scrap iron or steel, 81,830 tons of ore, 121,007 short tons of limestone, 55,450 short tons of dolomite, 20,540 short tons of lime, 19,090 short tons of silica sand, 11,401 short tons of magnesite and 23,734 tons of ferro-alloys.

ROLLED AND DRAWN STEEL

In 1939 there were 13 hot rolling mills in operation, 1 cold rolling plant and 2 making cold drawn shapes. Nine of these mills were in Ontario, 3 in Nova Scotia, 3 in Quebec and 1 in Manitoba. One rolling mill in Ontario and 1 in Alberta were idle throughout the year.

Rolling mill sales advanced 28 per cent to \$58,978,429 from \$46,040,787 in 1938. The main items for the year under review were—251,164 tons of bars at \$16,581,204; 226,311 tons of plates, sheets, hoop, band and strip at \$17,614,271; 156,262 tons of semi-finished rolled products, such as blooms, etc., at \$5,936,729; 87,563 tons of wire rods at \$3,954,970; 82,072 tons of structural shapes at \$4,554,201; 144,344 tons of rails and rail fastenings at \$7,080,427; 12,182 tons of other rolled forms at \$785,502 and miscellaneous products, not rolled, at \$2,471,125.

Imports of rolling mill products were valued at \$32,335,519 in 1939 against \$25,470,444 in 1938. Of this year's total, \$23,286,673 came from the United States and \$7,964,021 from the United Kingdom.

Table 140.—Provincial Distribution of Active Plants in the Primary Iron and Steel Industry, 1939

Province	No. of firms	Pig Iron		Steel Ingots and Castings		Rolling and drawing mills	Ferro-alloys (a)
		No. of plants	No. of blast furnaces	No. of plants	No. of steel furnaces		
Nova Scotia.....	4	1	3	2	14	3	.....
Quebec.....	13	.....	.....	10	19	3	1
Ontario.....	16	3	7	10	41	9	3
Manitoba.....	3	.....	.....	3	4	1	.....
Alberta.....	1	.....	.....	1	1	.....	.....
British Columbia.....	4	.....	.....	4	8	.....	.....
Canada.....	(b) 39	4	10	30	87	16	4

(a) Not including artificial abrasive plants which made ferro-silicon as a by-product.

(b) Some firms operate in more than one province.

Table 141.—Principal Statistics of the Primary Iron and Steel Industry, 1939

Years	No. of plants	Capital employed	Average number of employees	Salaries and wages	Cost of fuel and electricity at works	Cost of material at works	Gross selling value of products at works
		\$		\$	\$	\$	\$
Nova Scotia.....	6	22,015,230	2,252	3,248,185	1,296,558	7,028,632	15,223,484
Quebec.....	14	14,258,351	2,473	3,088,867	813,224	3,461,268	9,410,406
Ontario.....	25	75,269,867	8,594	13,378,862	3,866,771	18,586,517	48,925,939
Manitoba.....	4	1,732,926	406	538,227	172,766	424,684	1,610,745
Alberta.....	1	283,877	102	156,376	25,342	128,275	763,907
British Columbia.....	4						
Canada.....	54	113,660,251	13,827	20,410,517	6,174,661	29,629,376	75,934,481

NOTE.—Profits or losses cannot be calculated from above figures as data are not available for general expense items, such as, interest, rent, depreciation, taxes, insurance, advertising, etc.

Table 142.—Production of Pig Iron and Sales by the Producers, 1939

Grades	Total tonnage made	Sales	
		Quantity	Income from sales
	Long tons	Long tons	\$
Basic.....	655,560	24,685	552,309
Foundry.....	71,709	86,738	1,891,656
Malleable.....	28,462	60,554	1,313,608
Total.....	755,731	171,977	3,757,573

Table 143.—Iron Ore, Fuel and Flux Charged to Iron Blast Furnaces, 1935-1939

Years	Iron ore	Mill cinder, scale, etc.	Scrap	Coke	Limestone
	Long tons	Long tons	Long tons	Short tons	Short tons
1935.....	1,039,234	55,269	30,714	577,355	278,469
1936.....	1,218,823	49,091	20,386	672,210	345,622
1937.....	1,604,073	119,910	16,467	890,384	470,549
1938.....	1,234,433	66,614	19,123	697,615	345,182
1939.....	1,317,952	106,834	18,932	775,869	357,377

Table 144.—Imports into Canada, and Exports of Pig Iron, 1935-1939

Years	Imports		Exports	
	Long tons	\$	Long tons	\$
1935.....	8,920	143,726	13,759	287,396
1936.....	3,960	74,589	13,904	304,682
1937.....	6,371	144,354	38,516	851,701
1938.....	2,122	62,494	10,546	224,261
1939.....	587	15,176	10,728	221,787

Table 145.—Blast Furnaces in Canada, 1937 to 1939

Names of Companies	Location of plants	Number of stacks	Total daily capacity (24 hours)	Number of days in blast		
				1937	1938	1939
Dominion Steel and Coal Corporation, Ltd.	Sydney, N.S.....	1	Long tons 350	357	165	31
		1	300	.....	.....	265
		1	550	363	365	365
Total.....		3	1,200			
Canadian Furnace Company, Limited.....	Port Colborne, Ont.....	1	350	245	193	200
The Steel Company of Canada, Limited...	Hamilton, Ont.....	1	325	365	365	158
		1	650	365	365	365
Total.....		2	975			
Algoma Steel Corporation, Limited.....	Sault Ste. Marie, Ont.....	1	300	.....	.....	.....
		1	300	.....	.....	.....
		1	450	365	290	362
		1	550	.....	.....	85
Total.....		4	1,600			
Total for Canada.....		10	4,125			

Table 146.—Production of Ferro-Alloys, 1927-1939

Years	Long tons	Years	Long tons
1927.....	56,230	1934.....	31,921
1928.....	44,842	1935.....	56,616
1929.....	89,116	1936.....	76,284
1930.....	65,223	1937.....	82,072
1931.....	46,764	1938.....	55,926
1932.....	16,161	1939.....	76,375
1933.....	30,133		

Table 147.—Production of Steel Ingots and Steel Castings, by Grades, 1935-1939

(Long tons)

Years	Steel Ingots		Direct Steel Castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1935.....	872,444	36,742	9,119	645	22,577	941,527
1936.....	1,037,713	43,836	10,208	575	23,447	1,115,779
1937.....	1,274,992	61,236	23,827	1,016	41,811	1,402,882
1938.....	1,047,203	55,891	15,525	759	35,812	1,155,190
1939.....	1,259,231	71,177	15,601	834	38,027	1,384,870

Table 148.—Materials Used in Steel Furnaces, 1939

Materials	Unit of measure	Quantity	Cost of purchased materials
			\$
(a) Metals—			
Pig iron—Own make.....	Long ton	646,158	.....
Purchased.....	Long ton	8,392	206,379
Scrap iron or steel—Own make.....	Long ton	332,512	.....
Purchased.....	Long ton	495,183	7,227,009
Spiegeleisen.....	Long ton	2,790	62,364
Ferromanganese.....	Long ton	13,961	887,536
Silicomanganese.....	Long ton	959	84,932
Ferrosilicon.....	Long ton	4,233	226,408
Ferrochrome, high carbon.....	Long ton	483	55,822
low carbon.....	Long ton	512	119,937
Ferromolybdenum.....	Long ton	10	18,896
Ferrophosphorus.....	Long ton	478	42,203
Ferroselenium.....	Long ton	1	913
Ferrotitanium.....	Long ton	118	23,498
Ferrotungsten.....	Long ton	95	173,250
Ferrozirconium.....	Long ton	19	2,122
Other ferro-alloys.....	Long ton	25	55,834
Aluminium ingots.....	Short ton	249	87,837
Copper ingots.....	Short ton	264	46,217
Silicon metal.....	Short ton	1,120	29,042
Nickel.....	Short ton	300	187,001
Other metals.....	Short ton	174	42,026
(b) Ores—			
Ore, iron, crude.....	Long ton	81,095	501,436
Ore, iron, calcined, roasted or treated.....	Long ton	403	2,480
Ore, manganese.....	Long ton	6	287
Ore, chrome.....	Long ton	326	10,255
(c) Other materials—			
Coal, anthracite.....	Short ton	246	2,184
bituminous.....	Short ton	99	813
Coke.....	Short ton	4,510	38,938
Charcoal.....	Short ton	44	1,369
Dolomite, crude.....	Short ton	40,592	78,904
calcined.....	Short ton	14,858	99,838
Fluorspar.....	Short ton	7,972	122,778
Lime.....	Short ton	20,540	183,807
Limestone, Canadian.....	Short ton	39,708	65,161
Imported.....	Short ton	81,299	69,565
Magnesite.....	Short ton	11,401	351,680
Electrodes.....			208,565
Silica sand.....	Short ton	19,090	122,123
Moulding sand.....	Short ton	80	900
Other foundry sand.....	Short ton	15,495	82,405
Firebrick, fireclay and other refractories.....			620,259
Calcium molybdate and molybdenum oxide briquettes.....	Short ton	56	70,885
Calcium silicon.....	Short ton	124	27,925
All other materials.....			794,734
Total Value of Metals, Ores and Other Materials Used.....			13,066,527

Table 149.—Summary of Steel Furnace Capacity in Canada, 1939

Type of furnace	Number of furnaces	Total rated annual capacity
Basic open hearth.....	40	(Long tons) 1,774,946
Electric.....	44	279,076
Converter.....	3	2,600
Total.....	87	2,056,622

Table 150.—World Production of Pig Iron and Ferro-Alloys, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	*1939	Producing Country	1937	1938	*1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	8,493,100	6,761,100	.....	—concluded			
Union of South Africa.....	271,887	289,822	314,721	Netherlands.....	306,849	295,276	272,000
Canada.....	980,927	761,353	831,416	Norway.....	178,375	171,004	.....
India.....	1,629,301	1,570,712	.....	Poland.....	712,857	948,367	810,000
Australia (b).....	947,948	926,678	1,141,214	Roumania.....	125,225	130,585	115,239
Total.....	12,320,000	10,310,000	2,287,000	Spain.....	126,000	432,949	450,000
FOREIGN COUNTRIES				Sweden.....	680,721	702,309	612,000
Austria.....	381,479	(c)	.....	U.S.S.R. (e).....	14,291,000	14,756,000	15,374,000
Belgium.....	3,743,675	2,387,813	.....	Yugoslavia.....	39,291	58,326	60,141
Czecho-Slovakia.....	1,648,609	1,214,500	900,000	Belgian Congo.....	556	(a)	.....
Finland.....	23,616	35,388	.....	Mexico.....	88,300	(a)	.....
France.....	7,789,211	5,965,575	7,826,069	United States.....	37,127,277	19,160,861	31,854,551
Germany.....	15,707,743	(c)18,220,130	19,828,000	Brazil.....	96,552	120,420	145,982
Hungary.....	352,282	329,724	350,000	Japan.....	2,758,858	(a)	(a)
Italy.....	860,497	914,177	950,000	Korea.....	(a)	(a)	(a)
Luxemburg.....	2,472,814	1,526,212	1,812,000	Manchuria.....	(a)	(a)	(a)
				Philippine Islands	(estimated)	(a)	.....
				Total (d).....	90,300,000	71,000,000	81,360,000
				World's Total....	102,500,000	91,000,000	83,647,000

(a) Information not available. (b) Years ended June 30.

(c) Austria included with Germany from March 15, 1938.

(d) Including an allowance for China. (e) Excluding ferro-alloys.

* Chiefly estimated.

Table 151.—World Production of Steel Ingots and Castings, 1937, 1938, and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	*1939	Producing Country	1937	1938	*1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	12,894,000	10,397,900	.....	—concluded			
Union of South Africa.....	279,700	294,822	349,155	Latvia.....	2,855	2,598	.....
Canada.....	1,402,882	1,155,190	1,384,827	Luxemburg.....	2,470,588	1,413,818	1,650,000
India.....	895,229	936,493	.....	Poland.....	1,428,023	1,526,583	1,200,000
Australia (c).....	1,097,639	1,166,075	1,204,830	Roumania.....	235,495	272,165	263,071
Total.....	16,700,000	13,900,000	2,939,000	Spain.....	165,354	463,361	480,000
FOREIGN COUNTRIES				Sweden.....	1,088,141	956,669	1,080,000
Austria.....	639,457	(b)	.....	U.S.S.R.	17,149,000	17,500,000	17,400,000
Belgium.....	3,801,586	2,243,213	3,060,000	Mexico.....	(a)	72,471	.....
Czecho-Slovakia.....	2,254,879	1,710,000	1,230,000	United States (d).....	50,568,701	28,349,991	47,141,709
France.....	7,794,997	6,087,902	8,400,000	Brazil.....	75,223	88,238	109,283
Germany.....	19,050,372	(e)22,874,857	24,140,000	Japan.....	5,719,488	5,930,000	6,230,000
Hungary.....	655,000	(a)	740,000	Korea.....	(a)	(a)	.....
Italy.....	2,065,582	2,270,961	2,340,000	Manchuria.....	(a)	(a)	.....
				Total.....	115,600,000	92,000,000	115,464,000
				World's Total....	132,300,000	106,000,000	118,403,000

(a) Information not available.

(b) Included with Germany from March 15, 1938.

(c) Years ended June 30.

(d) Excluding steel castings which were produced by companies not manufacturing steel ingots.

(e) Includes Austria from March 15, 1938.

* Chiefly estimated.

LITHIUM

The principal commercial lithium ores are amblygonite, a fluophosphate of lithium and aluminium; spodumene, a silicate of these two elements, and lepidolite, or lithia mica, also a silicate. The lithia content of these minerals, as mined, commonly ranges around 8 to 9 per cent for amblygonite, 4 to 7 per cent for spodumene, and 3 to 5 per cent for lepidolite. All of the above minerals are known to occur in Canada but there has, as yet, been only a small production, mainly of lepidolite and spodumene. The important deposits are all in Manitoba in the southeastern part of the province. The first commercial shipment of Canadian lithium ore to be officially recorded was reported during 1937. This production came from deposits located at Bernic Lake, Manitoba, and was valued at \$1,694; the mineral was consigned to the United States for the manufacture of lithium compounds and possible lithium metal. No commercial shipments of lithium ores from Canadian mines were reported in 1939. It has been stated that the lepidolite from the "Silver Leaf" deposits in Manitoba contains substantial quantities of caesium and rubidium. Operations were resumed late in 1939 and continued in 1940 at the Bernic Lake lithium deposits of the Lithium Corporation of Canada Limited; and it was reported that commercial shipments of lithium ore might be resumed during 1940.

"Metal and Mineral Markets", New York, quoted lithium metal, May, 1940, per pound, 98 to 99 per cent 100 pound lots, \$15. Amblygonite was quoted, April, 1940, per ton F.O.B. mines 8 to 9 per cent Li_2O , \$40. Lepidolite, per ton, \$24 to \$25 for ordinary grades, lump, F.O.B. mines.

Statistics relating to possible imports of lithium, lithium ores or lithium compounds are not shown separately in Canadian trade reports.

Table 152.—Production of Lithia Mica in Specified Countries, 1936-1939.
(Imperial Institute, London).

(Long tons)

Country	1936	1937	1938	1939
South West Africa.....	852	1,030		423
Canada.....		(£342)		
France.....	400	(a)	(a)	
Portugal.....		109		
United States (lithium minerals).....	1,108	1,212	796	1,777
Argentina.....	60	181	(a)	

(a) Information not available.

MAGNESIUM

No magnesium metal has been produced in Canada during recent years. However, in 1918, the manufacture in the Dominion of metallic magnesium was undertaken by the Shawinigan Electro Metals Company Limited at Shawinigan Falls, Quebec, from imported magnesium chloride salts. It is also stated that during the period 1916-1918, the Consolidated Mining and Smelting Company of Canada, Limited, produced approximately 100 tons of metallic magnesium at Trail, British Columbia, from imported magnesium chloride. This same company reported that in 1939 the development of an improved process on a semi-commercial scale for the production of magnesium at Trail had been successfully concluded.

The United States Bureau of Mines in its "Minerals Yearbook" for 1939 states:—"Increased interest in aircraft in the present national-defence program of the United States has again emphasized the growing importance of magnesium and other light alloys. Production (sales) of primary magnesium in the United States in 1938 was greater than ever before. Outside of the United States, production of magnesium increased at an even more rapid rate. World output totalled possibly 22,000 metric tons, an increase of 22 per cent over that indicated in 1937. Germany continued as the outstanding producer, with an estimated output of 12,000 tons. The rapid growth in the use of magnesium abroad is due to the armament and self-sufficiency programs of totalitarian and democratic countries, as well as to development of new uses based upon its lightness and strength. Sales of primary magnesium in the United States in 1938 totalled 2,410

short tons. The 1938 estimate of magnesium production by countries is as follows:—Greater Germany, 12,000; United Kingdom, 2,200; United States (sales) 2,185; Japan 2,000; France 1,800; Switzerland 800; U.S.S.R. 600; and Italy 400. The magnesium chloride electrolytic process continued to supply the greater part of the output. The principal raw materials used were potash final liquor, carnallite, magnesite and brine. It is expected that a larger part of the output will be furnished by the thermal reduction process in 1939 when new plants in the United Kingdom, Japan and Italy are scheduled to begin production. These new plants will use magnesite and dolomite as raw material."

Sales of new magnesium ingot in the United States during 1939 totalled 10,650,121 pounds, an increase of 121 per cent over 1938. Magnesium was used in 1939 in the construction of many more parts of airplanes. It was reported in March, 1940, that the Dow Chemical Company had commenced construction of a \$5,000,000 plant at Freeport, Texas for the production of magnesium from sea water.

Data relating to any Canadian imports of magnesium metal are not published separately. Imports of magnesium alloys from June 3, 1939, to December 31, 1939, were appraised at \$575.

"Metal and Mineral Markets"—New York—Prices September 21, 1939, and May, 1940, were:—per pound ingots (4 x 16 in.) 99·8 per cent, carload lots, 27 cents; extruded sticks, carload lots, 34 cents.

MANGANESE ORE

Commercial shipments of manganese ore from Canadian mines during 1939 totalled 396 short tons valued at \$3,688; of these shipments 4 tons valued at \$88 were made from the East Mountain deposits, Colchester County, Nova Scotia, and 392 tons worth \$3,600 from Turtle Creek in Albert County, New Brunswick.

The manganese deposits of New Brunswick fall into two main classes, "Bog ore" and "Hard ore". According to the Department of Mines, New Brunswick, the bog ores are extensive but the market very limited, the chief demand being for hard ores containing more than 30 per cent manganese. In 1939, the New Brunswick government sampled a deposit of manganiferous iron ore located in Carleton County averaging iron 26·26 per cent; manganese 12·97 per cent; sulphur 0·09 per cent and phosphorus 0·9 per cent.

The Department of Mines and Resources, Ottawa, reports that the manganese ores, which have been mined in Canada are pyrolusite, manganite, psilomelane, and bog manganese. These, with the exception of the bog manganese, were mostly ores with a high manganese content and fairly free from deleterious constituents. They were usually in small lots and were derived from various localities in Nova Scotia, New Brunswick and British Columbia.

Although manganese is used in both the ferrous and non-ferrous metallurgical industries, the bulk is consumed in the manufacture of iron and steel. Most of the ore entering this industry is used in the manufacture of ferromanganese and spiegeleisen, the forms in which manganese is usually added to steel. A considerable quantity of manganese ore is used by producers of storage batteries and certain manganese ores are used by the chemical, ceramic, and glass industries. A process for the production of manganese had been practically completed in 1939 by the Consolidated Mining and Smelting Company of Canada, Limited.

Engineering and Mining Journal's "Metal and Mineral Markets"—New York—quoted manganese ore, August 31, 1939, as follows:—per long ton unit of manganese, c.i.f. North Atlantic ports, cargo lots, exclusive of duty: Brazilian, 46 to 48 per cent manganese, 27 cents; Chilian, 47 per cent minimum, 27 cents; Indian, 48 to 50 per cent, 28 cents; Caucasian, 52 to 55 per cent, 29 cents; South African, 50 to 52 per cent, 28 cents; 44 to 48 per cent, 24 cents. Prices May, 1940, were: Brazilian, 46 to 48 per cent manganese, 47 cents; Chilian, 48 per cent manganese, 49 cents; Indian, 48 to 50 per cent manganese, 49 cents; South African, 50 to 52 per cent manganese, 50 cents; Cuban, 45 to 47 per cent manganese, not dutiable, 51½ cents; 50 to 52 per cent, 62 cents. Prices nominal.

Imports into Canada of manganese oxide during 1939 totalled 59,573,600 pounds valued at \$621,931 compared with 42,100,000 pounds at \$463,673 in 1938. Of the 1939 imports, 45,074,300 pounds were imported direct from the United States and 14,471,800 from British South Africa. In 1938 imports from the Gold Coast amounted to 37,914,000 pounds valued at \$371,564.

Table 153.—Production of Manganese Ore in Canada, 1924-1939

Year	Tons	Value	Year	Tons	Value
		\$			\$
1924.....	584	4,088	1935.....	100	800
1925-1929.....			1936.....	221	1,596
1930.....	273	1,356	1937.....	85	817
1931.....	117	2,893	1938.....		
1932-1934.....			1939.....	396	3,688

The total production of manganese ore in Canada since 1886 totalled 16,377 short tons valued at \$458,698. The largest annual tonnage in those years was 1,801 in 1888 and the greatest annual value was \$89,544 for 957 tons produced in 1916.

Table 154.—Consumption of Manganiferous Ore and Manganese Compounds in Specified Canadian Industries, 1938 and 1939

Industry	Item	1938		1939	
		Quantity	Value	Quantity	Value
			\$		\$
Electrical Apparatus and Supplies	Manganese dioxide..... pound	4,187,176	84,368	5,597,349	108,558
Paints, Pigments and Varnishes.	Manganese salts..... pound	46,396	5,427	52,461	6,017
Steel Ingots and Castings.....	Ore, manganiferous (foreign)..... pound	227,296	1,300	13,016,640	25,252
	Spiegeleisen..... long ton	2,518	86,833	2,790	92,364
	Ferromanganese..... long ton	11,710	614,317	13,961	887,536

Note.—In addition to the consumption recorded in the table above, a considerable quantity of manganiferous ore is employed in the manufacture of ferro-alloys.

Table 155.—World Production of Manganese Ore, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939
BRITISH EMPIRE			
Gold Coast (shipments).....	527,036	324,207	336,312
Northern Rhodesia.....	2,341	2,735	2,970
Union of South Africa.....	621,229	543,028	413,071
Canada.....	76		354
India.....	1,051,594	967,929	
Unfederated Malay States.....	32,793	31,970	31,448
Australia.....	1,142	594	
New Zealand.....	5	90	486
Total.....	2,240,000	1,870,000	785,000
FOREIGN COUNTRIES			
Bolivia.....			244
Bulgaria.....	3,000	1,857	
Czecho-Slovakia.....	104,664	(a)	
Germany.....	177	(a)	
Greece.....	6,842	6,963	
Hungary.....	24,691	21,870	
Italy.....	33,002	47,529	
Portugal.....	312	548	591
Roumania.....	49,947	59,304	40,909
Sweden.....	6,031	5,983	
U.S.S.R. (estimated).....	2,770,000	2,900,000	
Yugoslavia.....	4,369	3,699	5,566
Belgian Congo.....	30,498	7,603	
Egypt.....	183,377	150,694	117,989
Morocco (French).....	75,257	85,230	
Morocco (Spanish).....	650	150	
Costa Rica (exports).....	129	299	
Cuba.....	113,840	(b)110,523	(d) 96,770
Mexico.....	17	116	26

Table 155.—World Production of Manganese Ore, 1937, 1938 and 1939—Concluded

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939
FOREIGN COUNTRIES—concluded			
Porto Rico (exports).....	2,343	1,023	.....
United States (c).....	40,241	25,321	29,307
Argentina.....	596	430	641
Brazil.....	256,054	218,455	(d) 186,018
Chile.....	12,809	(a)	11,049
French Indo-China.....	5,207	2,179	.....
Japan.....	(a)	(a)	.....
Netherlands East Indies.....	10,908	9,534	11,883
Philippine Islands.....	5,600	40,240	.....
Portuguese India.....	4,013	9,478	.....
Turkey.....	522	2,151	511
Total.....	3,800,000	3,900,000	502,000
World's Total.....	6,000,000	5,800,000	.....

Manganese ore is also produced in Spain and China.

(a) Information not available.

(b) Low grade ore before concentration.

(c) Shipments. Excluding the following quantities of ore containing 10 to 35 per cent Mn, which are recorded by the United States Bureau of Mines as iron ore:—

1937.....151,955 long tons

1938.....33,620 "

1939.....239,544 "

(d) Exports.

MERCURY

Production of virgin mercury in Canada during 1939 totalled 436 pounds valued at \$1,226 compared with 760 pounds at \$760 in 1938. The output in both years originated at the Property of the Empire Mercury Mines Limited, located at Mud Creek, Bridge River area, British Columbia. During 1939 the Consolidated Mining and Smelting Company of Canada, Limited, conducted exploration work, both surface and underground, on a mercury bearing deposit situated at Pinchi Lake in the Omineca district of British Columbia. The company announced that an 85 per cent interest in the property had been optioned and several more claims staked; as the property appeared to be promising, plans were rushed for bringing it into production as early as possible. This plant should be in operation before midsummer 1940. Concurrent development of the property has been very favourable and in all probability will call for doubling the plant as soon as the 50 ton plant is in successful operation.

"World events in 1939 had a marked influence on the mercury industry in the United States and, combined with conditions within the industry itself, caused sharp fluctuations in the price, according to the Bureau of Mines, United States Department of the Interior. In January the monthly price was \$77.44 a flask. There was an upward movement in the early months of the year due to political tension abroad and to the speculation over what would be the selling policy for Italian and Spanish mercury should Franco win the Spanish civil war. Prices eased following Franco's victory and the resumption of combined selling by Mercurio Europeo, signalling attempts to market large quantities of metal rather than to run up the price. Upon the outbreak of the war between Great Britain and France and Germany in September apparently some consuming countries were found to be under-supplied. The United States, for example, had substantially lessened her importation of mercury since late in 1937 and had not increased domestic production to offset the decline in imports. Consumer's stocks in the United States must have been drawn on in 1938 and up to the opening of war in September 1939. Prices in the United States jumped in September and averaged \$140.00 for the month; they rose to \$145.60 for October; declined to \$134.98 in November and were \$141.20 in December. During this period the foreign price lagged greatly behind the domestic one. Whereas, the price differential in favor of selling in the United States was \$6 to \$11 a flask for the first 8 months of the year as against the tariff of \$19, in September it skyrocketed to \$49. The jump in the September differential was due largely to the decline in the exchange rate for the pound. Late in the year production in the United States began to respond to increased prices and imports increased. Conditions of obtain-

ing supplies abroad became more acute, however, and the foreign price rose precipitously, leaving the domestic price protected by tariff far behind. In February 1940 the Cartel price rose to \$205 c.i.f. New York, duty unpaid, and that for domestic metal was quoted as \$178 to \$182 a flask.

"Domestic production amounted to 18,633 flasks, the highest recorded since 1931, but only 10 per cent above the average for the 5-year period, 1934-38."—United States Bureau of Mines.

Table 156.—Imports of Mercury into Canada for Years Specified

Year	Pounds	\$	Year	Pounds	\$
1912.....	137,474	72,171	1917.....	71,608	76,232
1913.....	219,442	109,493	1918.....	56,936	68,903
1914.....	204,229	97,449	1937.....	394,354	371,178
1915.....	184,432	159,184	1938.....	49,584	49,564
1916.....	79,204	74,461	1939.....	*109,232	165,489

* 56,469 pounds from United States and 37,069 pounds from Italy, and in addition there were \$9,486 worth of mercury salts imported.

Table 157.—Mercury Consumed in Specified Canadian Industries, 1938 and 1939

Industry	1938		1939	
	Pounds	Value	Pounds	Value
		\$		\$
Medicinal and pharmaceutical preparations.....	12,666	10,249	14,159	14,613
Other chemicals.....	22,305	19,767	30,807	31,007
Electrical apparatus.....			2,161	
Gold mining.....			6,313	

NOTE.—In addition to the consumption specified, there is a considerable quantity of quicksilver employed by the mining industry in the recovery of both placer and lode gold.

Table 158.—World Production of Mercury, 1937, 1938 and 1939

(Supplied by the *Imperial Institute*)
(Lb.)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES —Con.			
Canada.....		760	436	Algeria.....	9,429	15,252	
Australia.....	710			Tunis.....	1,911	20,536	
New Zealand.....	1,344	760		Mexico.....	375,132	647,460	560,567
Southern Rhodesia.....			32	United States.....	1,254,608	1,367,316	1,416,108
FOREIGN COUNTRIES				Bolivia (exports).....	1,217		569
Austria.....	10,192	(a)		China (exports).....	131,925	4,941	963
Czecho-slovakia.....	208,989	220,000		Japan.....	(c) 44,000	(c) 45,000	
Italy.....	4,868,000	5,073,000		Korea.....			
Roumania.....	293	(a)		Turkey.....	37,269	45,408	
Spain (b).....	3,200,000	3,200,000					
				World's Total...	10,100,000	10,600,000	1,979,000

Quicksilver is also produced in Germany and U.S.S.R.

(a) Information not available.

(b) Figures are the amounts imported from Spain by the chief consuming countries.

(c) Estimated.

MOLYBDENITE

Molybdenite ore is the chief source of the metal molybdenum; the mineral, a soft steel-blue coloured sulphide, is usually found in pegmatite dykes and along the contacts of limestone and gneiss. The metal is employed chiefly in the manufacture of special alloy steels.

Canadian mine shipments of molybdenite concentrates in 1939 totalled 2,722 pounds valued at \$816 compared with 14,000 pounds worth \$4,500 in the preceding year. Of the 1939 output, 2,240 pounds valued at \$600 were produced in the Malartic area of Abitibi County, Quebec, by the Molybdenite Corporation of Canada Limited, while the balance of Canadian production represents concentrates shipped by Regnery Metals from its property located near Hawk Junction, Algoma District, Ontario.

A renewed interest in Canadian molybdenite deposits was apparent throughout 1939, especially after the declaration of war against Germany. In the Province of Quebec reports of work conducted during 1939 were officially received from Cheabella Mine Company (Montbeillard), Maniwaki Molybdenum Mines Limited, (Maniwaki), La Reine Holdings (Abitibi County), Quyon Molybdenite Company Limited (Quyon), Kindale Mines Limited (Gatineau County), Molybdenite Corporation of Canada Limited (Abitibi County) and Alloys Limited (Quyon District). In Ontario work was officially reported by Regnery Metals (Algoma), North American Molybdenum Corporation Limited (Renfrew County), Kenopo Mining and Milling Company Limited (Kenora District), and Puritan Mines Limited (Renfrew County). Operations during 1939 at molybdenite properties located in British Columbia were reported by Powell River Moly claims (Nanaimo District) and A. Langly (Stella Group, Omineca District). No shipments were reported from these properties and development chiefly represented assessment work. A discovery of molybdenite near Cranberry Portage, Manitoba, was recently reported.

The United States Bureau of Mines in an advance summary review states:—"The domestic production of molybdenum in 1939 amounted to 32,347 short tons of concentrates containing 30,324,000 pounds of metallic molybdenum, as compared with 36,157 tons of concentrates containing 33,297,000 pounds of metallic molybdenum in 1938.

"About 72 per cent of the domestic output of molybdenum came from the operation of the Climax Molybdenum Co. of Lake County, Colo. Production of molybdenum concentrates was also reported from Arizona, California, New Mexico, Utah, Washington, and Wisconsin.

"Concentrates shipped from mines in 1939 were 32,415,000 pounds of molybdenum with an estimated value of \$22,157,000, as compared with 25,727,000 pounds with an estimated value of \$17,977,000 in 1938.

"Exports of molybdenum concentrates in 1939 were 21,777 short tons, of which 9,071 tons went to the U.S.S.R., 4,681 tons to Japan, 3,778 tons to the United Kingdom, 1,480 tons to France, 1,367 tons to the Netherlands, 502 tons to Italy, and 898 tons to other countries. These were valued at \$14,036,441."

For most purposes molybdenite (MoS_2) is converted, before using, to ferromolybdenum or to calcium molybdate (a compound resulting from the roasting of molybdenite with lime and containing 35 to 45 per cent molybdenum). The latter, states the United States Bureau of Mines, is the cheaper method of preparing molybdenum for industrial applications. Molybdenum oxide in briquets is also used in making molybdenum additions to iron and steel. Improved processes of heat-treating and fabricating high-speed tool steels in which part of the tungsten has been replaced by molybdenum have increased the use of molybdenum in this field.

The only data published as relating to Canadian imports of molybdenum are those pertaining to calcium molybdate. Calcium molybdate imported into Canada during 1938 by manufacturers of steel for use exclusively in the manufacture of steel in their own factories totalled 181,377 pounds valued at \$63,131 compared with 222,990 pounds worth \$136,321 in 1939. Imports during both years came entirely from the United States. Imports into Canada of alloys used in the manufacture of steel or iron n.o.p. totalled 2,252,100 pounds valued at \$461,596 in 1939; some of these may have contained molybdenum.

"Metal and Mineral Markets"—New York—quoted molybdenum ore December, 1939 — per pound of contained MoS_2 , 90 per cent concentrate, 45 cents F.O.B. mines, London—per long ton unit, nominal at 50s for 85 to 90 per cent concentrate. Molybdenum per pound in 10 to 49 pound lots C.P. powder \$9.50; 99 per cent \$2.60 to \$3.00 Ferromolybdenum per pound of Mo, F.O.B. shipping point, 55 to 65 Mo, 95 cents. Molybdate, per pound of contained Mo, 50 cents.

Table 159.—Production of Molybdenite in Canada, 1925-1939

Year	Ores treated	Ores and concentrates shipped		MoS ₂ content of shipments
	Tons	Tons	Value (a)	Pounds
			\$	
1925.....	2,779	15.3	11,176	22,350
1926.....	4,490	12.6	10,472	20,943
1927.....				
1928.....				
1929.....	2,900	9.5	6,400	16,150
1930.....				
1931.....	12	0.61	280	1,222
1932-1936.....				
1937.....	5,307	8.25	8,147	(b)
1938.....	(b)	6.5	4,500	(b)
1939.....	1,492	1.3	816	(b)

(a) Value given by the operators.

(b) Not known.

Table 160.—World Production of Molybdenum Ore, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Cwt.)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—CON.			
Canada.....	147	140	24	Norway (MoS ₂ content).....	11,279	15,167	.....
Burma.....	81 lbs.			French Morocco (MoS ₂ content).....	3,200	3,350	.....
Australia.....	1,400	1,163		Mexico (MoS ₂ content).....	20,655	15,861	17,161
FOREIGN COUNTRIES				United States (MoS ₂ content).....	437,783	495,492	451,250
Italy (MoS ₂ content).....	15	4		Peru (MoS ₂ content).....	1,629	3,006	3,773
Roumania (Bi-Mo Ore).....	530	3,150	18,700	Japan.....	(a)	(a)	.....
				Korea.....	(a)	(a)	.....
				Turkey (MoS ₂ content).....	720	1,340	.....

Molybdenum ore is also produced in Yugoslavia and China.

(a) Information not available.

RADIUM-URANIUM

Commercial production of radium-uranium bearing ores in Canada is confined, at the present time, entirely to the Great Bear Lake district in the Northwest Territories. Eldorado Gold Mines Limited operates a mine and mill at Echo Bay, Great Bear Lake, Northwest Territories, and Bear Exploration and Radium Limited conducted mining and milling operations in 1939 at Contact Lake in the same district. Pitchblende concentrates produced by the Eldorado Company are treated for the recovery of radium and uranium at a refinery owned and operated by the company at Port Hope, Ontario. Important quantities of silver and some copper also occur with the pitchblende at the Eldorado mine, and these metals, in the form of concentrates, are shipped principally to the metallurgical works of other firms for the recovery of the silver and copper content.

The property of Bear Exploration and Radium Limited was active until July 31 and 6,658 tons of ore were milled; shipments of silver-bearing concentrates were made by this company to the Trail smelter of Consolidated Mining and Smelting Company of Canada Limited and to the Deloro Smelting and Refining Company, Deloro, Ontario.

"The St. Joachimsthal mines, formerly part of Czechoslovakia, were incorporated in the German Reich in October, 1938. These deposits are estimated to contain more than 300 grams of radium still unmined and at the time of their incorporation into Germany were producing about 180 to 190 metric tons of pitchblende ore yielding about 5 grams of radium a year. Operations were under control of the Czech Government; and the output, ranging from 2 to 10 grams annually in recent years, has been purchased principally in England. In March, 1939 the Auergesellschaft, A. G., Berlin, Germany's leading manufacturer of radioactive metals (one of its

products being mesothorium from gas-mantle residues) obtained a concession from the German Government to operate the Joachimsthal mines under lease and extract the radium at its works in Berlin."—United States Bureau of Mines.

Eldorado Gold Mines, Limited, reported that in 1939 there were 522 tons of pitchblende concentrates received from the mine at its Port Hope refinery. Ore reserves at the mine were maintained throughout the year and are now ample for the operation of the present mill for the next four years; the refinery was operated for approximately eleven and a half months. The advent of war in September, 1939, created many new problems in the marketing of products, particularly as more than 90 per cent are exported. However, as a partial compensation for this, there has been a gradual increase in the demand for products from the United States and the Far East. Products of the company include: radium bromide and sulphate; uranium (yellow, orange, black and nitrate); polonium, silver-copper concentrate; silver sulphide and cobalt-copper-nickel concentrate.

For statistical purposes, the data relating to the mining and milling and the refining of pitchblende-silver ores in Canada are combined, respectively, with those of silver-lead-zinc mining and non-ferrous smelting industries. Figures pertaining to the value of production of radium and uranium in Canada were not published prior to 1939.

The Union Minière du Haut Katanga is the world's other large producer of radium but little information is available regarding the mining of radium ores by this organization in the Belgian Congo or to the refining operations conducted at Oolen, Belgium.

Imports of radium into Canada during 1938 were valued at \$22,559 compared with \$15,929 in 1939. Data relating to Canadian exports of radium and imports and exports of uranium are not shown in Canadian Government Publications.

"Metal and Mineral Markets", New York, quoted radium September, 1939—per mg. radium content \$25 to \$30, as to quantity. September, 1939, New York quotations for uranium were—black oxide kgs. \$2.65—per pound; yellow kgs. \$1.75—per pound.

Table 161.—World Production of Uranium Minerals, 1937, 1938 and 1939

(Supplied by the Imperial Institute)
(Cwt.)

Producing Country	1937	1938	1939
BRITISH EMPIRE			
Canada.....	(b)	(b)	(d)
FOREIGN COUNTRIES			
Czechoslovakia (U_3O_8).....	217	(a)	.....
Portugal (U_3O_8).....	(c)	(c)	(c)
United States (U_3O_8).....	219	544	624

Uranium minerals are also produced in U.S.S.R. and the Belgian Congo.

(a) Information not available.

(b) The production of radium and uranium salts were:—

	Radium	Uranium
	grams.	salts
	lb.	lb.
1936.....	15,541	211,857
1937.....	23,770	546,000

(c) The content of radium in salts was 2,900 mgrams in 1937, 5,500 mgrams in 1938 and 796 mgrams in 1939.

(d) Value of radium and uranium products \$1,121,553.

SELENIUM

Selenium production in Canada represents a by-product in the electrolytic refining of blister and anode copper made from Saskatchewan, Manitoba, Ontario, and Quebec ores. It is recovered at Copper Cliff, Ontario, by the International Nickel Company of Canada, Ltd., and at Montreal East, Quebec, by the Canadian Copper Refiners, Ltd.

Production in Canada during 1939 totalled 150,771 pounds valued at \$266,714 compared with 358,929 pounds worth \$622,742 in 1938. Of the output in 1939, there were 23,841 pounds recovered from copper-gold ores mined and smelted in Quebec and 126,930 pounds in Ontario from nickel-copper ores. Selenium is also contained in the copper-gold ores of the Flin Flon mine in Manitoba and Saskatchewan but its commercial recovery (sales) from such ores was not reported in 1939.

The International Nickel Company of Canada, Ltd., reported that the demand for selenium was stronger in 1939 and that the company's sales were greater than in 1938.

One of the principal uses for selenium is as a decolorizer in the manufacture of glass. It is used with cadmium sulphide as a pigment and with sulphur as a secondary vulcanizing agent in the rubber industry. Selenium is used in copper alloys and stainless steel to increase machinability. Selenium is marketed chiefly as a black to steel-gray amorphous powder, also in cakes and sticks.

According to the United States Bureau of Mines more and more selenium is being recovered from copper refining, and as the use of selenium in glass no longer seems to be increasing, the search for new uses has been resumed; rubber-making continues to be the second largest use of the element next to glass making.

"Metal and Mineral Markets"—New York—quoted selenium December, 1939, per pound \$1.75 for black, powdered 99.5 per cent pure.

General statistics on employment, etc., as relating to the production of both selenium and tellurium are included with those compiled for the Canadian non-ferrous smelting and refining industry. Figures pertaining to Canadian imports and exports of selenium were not published separately prior to 1939. Exports of selenium and salts of, from Canada in 1939, totalled 238,925 pounds valued at \$374,700; of these 128,293 pounds went to the United Kingdom and 109,411 pounds to the United States.

Table 162.—Production of Selenium in Canada, 1931-1939

Year	Pounds	\$	Year	Pounds	\$
1931 (a).....	21,500	40,850	1936.....	350,857	621,017
1932.....			1937.....	397,227	687,203
1933.....	48,221	70,345	1938.....	358,929	622,742
1934.....	104,924	171,311	1939.....	150,771	266,714
1935.....	366,425	703,536			

(a) First commercial production in Canada.

In 1939 the Canadian glass industry consumed 3,392 pounds of selenium valued at \$5,851. Consumption in the same industry in 1938 totalled 3,186 pounds worth \$5,711. Complete data on world production of selenium and tellurium are not available.

TELLURIUM

As with selenium, the metal is recovered in Canada as a by-product in the electrolytic refining of anode copper at Montreal East, Quebec, by Canadian Copper Refiners, Limited, and at Copper Cliff, Ontario, by the International Nickel Company of Canada, Limited. The production in Ontario represents the recovery of the metal solely from nickel-copper ores; whereas at Montreal East the metal originated in copper-gold ores mined in Manitoba, Saskatchewan, and Quebec.

Production of tellurium in Canada during 1939 totalled 2,940 pounds valued at \$4,769; this output was credited entirely to the province of Quebec. No commercial production was reported in Ontario, Manitoba or Saskatchewan in 1939.

Tellurium is used in rubber hose and cable coverings and greatly increases the toughness and abrasion resistance of rubber. Tellurium is usually marketed as slabs and sticks of 99 per cent purity, but for use in compounding rubber it is furnished in the form of a steel gray powder. The metal is also used to harden, toughen and increase the corrosion resistance of lead. Both tellurium and selenium impart free-cutting properties to alloy and plain carbon steels.

The annual report of the International Tin Research and Development Council for 1938 states that the investigation of the mechanical properties of tin-rich tellurium tin alloys is now completed. The most notable results are the remarkable work-hardening properties and the high ratio of creep strength to tensile strength. While the absolute values are low compared with certain other tin alloys, these properties indicate that tellurium may be a valuable addition to other tin alloys.

The International Nickel Company of Canada, Limited reported that the industrial demand for tellurium continues to be small, although it is interesting to record that a leading fabricator of copper products is offering "free-machining" copper and copper alloys containing small amounts of tellurium.

Data relating to Canadian imports and exports of tellurium are not shown separately in the trade reports of the Dominion. "Metal and Mineral Markets"—New York, quoted tellurium at \$1.75 per pound, September 7, 1939, and May, 1940.

Table 163.—Production of Tellurium in Canada, 1934-1939

Year	Pounds	\$	Year	Pounds	\$
1934*	5,130	25,599	1937	41,490	71,777
1935	16,425	32,850	1938	48,237	82,967
1936	35,591	62,997	1939	2,940	4,769

* First commercial production in Canada.

TIN

Tin is known to occur in the Snowflake and Sullivan mines in British Columbia and in certain pegmatites in southeastern Manitoba. It has also been reported at New Ross, Nova Scotia. No tin ore deposits have been worked or tin ore production recorded in Canada during recent years. The Nova Scotia Department of Public Works and Mines reported that some prospecting was performed in 1938 by Mr. George Mitchell on an occurrence of molybdenum and tin in the New Ross area, Lunenburg County. No official reports of any primary tin production in Canada were received in 1939 and no development of any Canadian tin bearing deposits was reported.

"As considerable tin enters world trade in the form of ore, geographical data on world smelter output differs materially from those of mine output. For example, all ore from Bolivia and Nigeria is smelted in Europe. An appreciable part of the tin ore from Netherlands India is smelted in the Netherlands and the product of Siam and Indo-China is smelted in British Malaya. The only commercial tin ore smelter in the Western Hemisphere is in Argentina, and its output has increased somewhat in recent years. Germany (including Austria) produces little tin; and despite major efforts to provide substitutes, apparent consumption increased from 9,164 tons in 1936 to 13,474 in 1938. The acquisition of Czechoslovakia increased Germany's dependence on imported tin, as consumption there has averaged over 1,600 tons annually from 1936 to 1938, with little or no local production." (United States Bureau of Mines).

"Metal and Mineral Markets"—New York—reported that effective March 25, 1940, United States buyers of tin, rubber, jute and various other British Empire products will have to effect all such purchases in dollars or in "official" pounds. This news was contained in an order issued by the British Exchange Control on March 9. The action will prevent buyers of those British Empire Products from using the cheaper "Free" pound in making settlements. The exchange restrictions caused tin prices to rise, Straits tin advancing to 49 cents, New York, on March 9.

Table 164.—Imports of Tin and Tin Products into Canada, 1938 and 1939

Item	1938		1939	
	Pounds	\$	Pounds	\$
Tin in blocks, pigs or bars*	5,275,200	2,205,449	5,825,700	2,832,089
Tin foil	19,092	6,593	38,520	12,133
Collapsible tubes		45,484		64,523
Tin bichloride and tin crystals	129,053	28,467	84,942	22,889
Oxide of tin and copper	165,006	54,030	172,460	61,186
Phosphor tin and phosphor bronze in blocks, bars plates, etc.	595,098	158,137	740,691	235,420
Tin plate food containers		282,200		382,905
Tin plate containers, n.o.p.		346,671		427,231
Sheets, plate, hoop, etc., tin coated	155,976,500	8,814,992	173,812,900	9,239,372
Manufactures of tin plate painted, etc., manufactures of tin, n.o.p.		505,838		516,105
Kitchen or dairy holloware of iron or steel coated with tin		38,313		54,881
Arseniate, barseniate and stannate of soda	11,200	2,843	32,054	6,739

* Of the 1938 imports 3,378,400 pounds valued at \$1,400,871 came from the Straits Settlements and 1,730,000 pounds at \$730,772 from United Kingdom. Corresponding imports in 1939 were 3,384,400 pounds at \$1,623,553 and 1,816,400 pounds worth \$901,143.

Exports of tinware from Canada in 1938 were appraised at \$13,481; in 1939, corresponding exports were appraised at \$23,190.

Table 165.—Available Statistics on the Consumption of Tin in Specified Canadian Manufacturing Industries, 1938-1939

Industry	Item (used)	1938	1939
		Pounds	Pounds
Brass and Copper Products.....	Ingots.....	269,050	281,542
	Scrap.....	11,736	19,618
	Other.....	13,225	18,070
White Metal Alloys.....	Pig.....	2,756,326	2,902,169
	Plate.....	21,510	64,520
Iron and Steel and Their Products*.....	Scrap.....	57,867	60,754
	Tin.....	1,400,000	1,620,000

* Includes castings and forgings; boilers, tanks and engines; farm implements; machinery; hardware and tools; sheet metal products; wire; railway rolling stock; heating and cooking apparatus; automobile parts, etc., partly estimated.

Table 166.—Apparent Tin Consumption of the World, 1937-1938, by Countries, in Long Tons (1)

Country	1937	1938
Belgium.....	1,520	1,618
Canada.....	2,625	2,355
Czechoslovakia.....	1,731	1,560
France.....	9,175	9,049
Germany (2).....	12,392	13,474
India, British.....	2,595	2,494
Italy.....	3,584	4,618
Japan.....	8,190	10,963
Netherlands.....	1,470	1,400
Poland.....	1,272	1,819
Spain.....	942	1,082
Sweden.....	1,897	2,895
Switzerland.....	1,100	1,250
United Kingdom.....	25,971	18,290
U.S.S.R.....	25,125	16,174
United States.....	86,663	50,724
Other countries.....	12,448	11,826
Total.....	198,700	151,600

(1) As estimated by the Tin Research and Development Council.

(2) Includes Austria; the Saar is also included after February 17, 1935.

No data available for 1939.

Table 167.—World Production of Tin Ore, 1937, 1938 and 1939

(In terms of metal)

(Supplied by the *Imperial Institute*)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
United Kingdom.....	1,987	1,999	.....	Germany.....	*(a)	(a)	(a)
Nigeria.....	10,782	8,977	9,427	Italy.....	60	.....	.....
Northern Rhodesia.....	5	3	.....	Portugal.....	1,095	1,036	1,212
Southern Rhodesia.....	139	267	451	Belgian Congo.....	8,133	9,025	9,663
South West Africa.....	169	164	156	Cameroon (French).....	258	242	.....
Swaziland.....	108	122	114	Morocco (French).....	14	.....	.....
Tanganyika Territory.....	243	241	.....	Mozambique.....	6	4	7
Uganda (exports).....	361	399	347	Mexico.....	373	249	289
Union of South Africa.....	538	558	480	United States.....	168	109	34
Burma.....	4,636	4,412	.....	Argentina.....	1,423	1,886	1,657
Federated Malay States.....	75,117	41,206	49,525	Bolivia (exports).....	25,128	25,484	27,211
Unfederated Malay States.....	2,075	2,041	1,994	Peru.....	173	103	.....
Straits Settlements.....	72	114	206	China (smelter).....	11,100	11,600	10,400
Australia.....	3,256	3,329	.....	French Indo-China.....	1,577	1,599	1,470
Total.....	99,000	64,000	63,000	Japan.....	2,300	2,300	.....
				Netherlands East Indies.....	39,165	27,299	27,755
				Siam.....	15,786	14,704	15,638
				Total.....	107,000	95,000	95,000
				World's Total.....	206,000	159,000	158,000

NOTE.—In the case of countries for which assay figures are not published the metal content of the ores has been estimated on the following percentages—South West Africa 70, Swaziland 70, Uganda 70, Burma 70, Belgian Congo 70, Japan 70, Siam 72.

(a) Information not available.

TANTALUM-COLUMBIUM

Neither tantalum nor columbium ores are commercially produced in Canada, however, it is interesting to note that the Department of Mines and Resources, Ottawa, reports that columbite-tantalite has been found in small quantities in a number of feldspar mines in the Dominion.

Ferrocolumbium is used in the manufacture of stainless steels and it has been reported that the pure metal may be utilized in the construction of certain vacuum tubes.

Tantalum is strongly resistant to acid corrosion, is weldable and easily fabricated. It is used in chemical process equipment and electronic tubes. Due to its hardness and high melting point, tantalum carbide is a constituent of hard cutting-tool mixtures. Ferrocolumbium has become an important alloy for the manufacture of weldable high-speed steels.

Nigeria has been the principal producer of columbite and Australia of tantalite. Columbo-tantalite is also produced in the Black Hills, South Dakota, U.S.A. The United States Bureau of Mines Minerals Year Book, 1938, refers to the recovery of Columbo-tantalite at Manono, Katanga, Belgian Congo, as a by-product of the tin-mining operations of Geomines and its smelting in Brussels to an iron-tantalum-columbium alloy. The United States has taken most of the output of Nigeria and Australia. Imports of columbium ore into the United States in 1937 aggregated 461 short tons valued at \$306,086, all from Nigeria except 540 pounds valued at \$245 from Brazil. Tantalum ore imports in the United States in 1937 were 20,897 pounds valued at \$40,742 all from Australia. In 1938 the imports of tantalite into the United States rose to 41,706 pounds valued at \$80,092; the imports of columbite declined to 645,141 pounds valued at \$228,078. The Fansteel Metallurgical Corporation, North Chicago, Illinois, treat columbium and tantalum ores in the United States. Data relating to possible Canadian imports of columbium and tantalum ore or alloys are not published. "Metal and Mineral Markets", New York, quoted tantalum ore August 17, 1939—per pound Ta_2O_5 , \$1.50 to \$2.50 per 60 per cent concentrate, the price depending on source of supply. Columbium metal per kilo. base prices: rod \$560; sheet \$500. Tantalum metal per kilo, base price, \$160.60 for C.P. rod, sheet \$143; discounts on volume business. These same prices were quoted May, 1940.

TITANIUM

Ilmenite, the titanium ore so largely employed in the manufacture of pigments, is known to occur at several places in Canada and commercial shipments of the mineral have been made during past years from deposits located at St. Urbain and Ivry in the province of Quebec. During 1939, Canadian production came entirely from St. Urbain, Quebec, and totalled 3,694 short tons valued at \$21,267; the mineral was consigned chiefly to the United States.

Paul M. Tyler of the United States Bureau of Mines refers to the current uses of titanium as follows:—"Although pigments continue to represent the chief outlet for ilmenite, other fields of use are not being neglected. In metallurgy titanium is not only an effective deoxidizer and cleansing agent, but an alloying element as well. By addition of titanium, chrome-nickel steels are made more resistant to corrosion and chrome-molybdenum steels become easier to weld. In aluminium and sundry non-ferrous alloys, titanium refines the grain and otherwise contributes to better structure. A variety of low carbon as well as high and medium carbon alloys is now available, in addition to the older alloys that first found extensive application only for treating sheet steel and rails. To avoid employing expensive alloys W. Mathesius has patented (British) a process for introducing titanium into molten steel by carbon reduction from a cover slag. In welding-rod coatings, the principal function of rutile is to stabilize the ore, though it also tends to prevent the inclusion of oxides and nitride needles in the deposited metal."

Because of their great whitening and obliterating power, titanium pigments continue to be employed widely in paint, rubber, linoleum, leather, plastics, soap, printing inks, paper, textiles and ceramics.

Imports into Canada of antimony oxide, titanium oxide and white pigments containing not less than 14 per cent by weight of titanium totalled 4,710,481 pounds valued at \$512,219 in 1938 compared with 9,003,693 pounds at \$803,198 in 1939. Of the 1939 imports 1,689,329 pounds came from the United Kingdom and 7,302,923 pounds from the United States. No imports into Canada of titanium ore or rutile were recorded in 1939.

The bulk of the ilmenite used in the United States is imported from British India and is consumed in the manufacture of titanium pigments. Imports of rutile into the United States in 1939 were almost twice as large as in 1938; Australia is the leading foreign source with Brazil second.

United States quotations for titanium ore January, 1939, were:—Per gross ton, ilmenite, 45 to 52 per cent TiO_2 , F.O.B. Atlantic seaboard \$10 to \$12, according to grade and impurities. Rutile, per pound, guaranteed minimum 94 per cent concentrate, 10 cents, nominal; 88 to 90 per cent, \$55 per ton, C.I.F. New York ferrocarbontitanium per ton \$142.50 F.O.B. producer's plant. Quotations April, 1940, were:—titanium ore, per gross ton ilmenite, 50 to 60 per cent TiO_2 , F.O.B. Atlantic seaboard \$16 to \$18 according to grade and impurities. Titanium, per pound 96 to 98 per cent, \$5.00 to \$5.50. Ferrocarbontitanium per ton \$142.50 F.O.B. producer's plant.

Table 168.—Production of Titanium Ore in Canada (*), 1927-1939

Year	Short ton	\$	Year	Short ton	\$
1927.....	2,029	8,980	1934.....	2,023	14,161
1928.....	2,244	6,732	1935.....	2,288	16,400
1929.....	2,748	7,359	1936.....	2,566	18,318
1930.....	412	1,239	1937.....	4,229	26,432
1931.....	1,509	10,261	1938.....	207	1,449
1932.....			1939.....	3,694	21,267
1933.....					

* All from Quebec.

Table 169.—Consumption of Titanium Pigments in Canadian Paint Industry, 1931-1939

Year	Pounds	Cost at works	Year	Pounds	Cost at works
		\$			\$
1931.....	745,207	89,761	1935.....	2,513,026	261,506
1932.....	691,304	96,759	1936*.....	2,456,265	269,130
1933.....	1,061,249	128,969	1937*.....	3,748,341	362,869
1934.....	1,710,188	186,678	1938*.....	3,903,337	378,548
			1939*.....	5,088,234	494,914

* In 1936 includes 1,396,337 pounds of pure titanium white valued at \$193,638. In 1937 the quantity of pure titanium white totalled 1,299,857 pounds valued at \$193,107 in 1938, 1,341,359 pounds at \$200,552 and in 1939, 1,855,288 pounds at \$275,103.

NOTE.—Neither titanium white nor titanium alloys are commercially produced in Canada.

In 1938 there were 76 long tons of ferrotitanium valued at \$14,547 consumed in the manufacture of steel in Canada and in 1939, 118 tons at \$23,498 were consumed.

Table 170.—World Production of Titanium Minerals, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing country and description	1937	1938	1939	Producing country and description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
South West Africa—				Norway—			
Rutile.....	16			Ilmenite.....	66,270	48,404	
Canada (shipments)—				Rutile.....	184	120	
Titaniferous iron ore.....	3,776	185	3,298	Portugal—			
Federated Malay States (ex-ports)—				Ilmenite.....	1,433	559	403
Ilmenite.....	6,252	6,462	11,098	Cameroon (French)—			
India—				Rutile.....	101	116	
Ilmenite.....	181,047	252,220		Egypt.....	315	89	
Australia—				Senegal—			
Ilmenite.....	670	(a)		Ilmenite.....	3,026	8,803	
Rutile.....	1,123	(a)		Brazil (exports)—			
Rutile-ilmenite.....	72	(a)		Ilmenite.....	231	312	192
				Rutile.....	644	211	299

NOTE.—Titanium minerals are also produced in the United States, but figures are not available for publication. In recent years, however, the production of ilmenite has varied between 1,000 and 5,000 tons, and the production of rutile has been several hundred tons.

(a) Information not available.

TUNGSTEN

The Bureau of Mines, Ottawa, states that occurrences of tungsten-bearing minerals, usually in the form of scheelite, are known in Nova Scotia, New Brunswick, Manitoba, British Columbia, and in the Yukon Territory.

The only important production of tungsten ore in Canada reported previous to 1918 is that of 1912, being 14 tons of concentrates produced by the Scheelite Mines Limited, of Moose River, Nova Scotia. In 1915 the British Government commandeered all supplies of tungsten concentrates within the Empire at a fixed price of 55 shillings (\$13.50) per unit (22.4 pounds) of contained tungstic acid.

In 1917 a small test shipment of a few hundred pounds was made from Halifax County, Nova Scotia, and another from Dublin Gulch, Mayo District, Y.T., amounting in all to 580 pounds running 69.41 per cent WO_3 and netting \$234. The production in 1918 amounted to $13\frac{1}{2}$ tons valued at \$11,700 and with a small metallic content of 19,915 pounds of WO_3 . This production consisted of 11 tons of concentrates shipped to New York by the Acadia Tungsten Mines Limited, operating at Burnt Hill, New Brunswick, with also a few small consignments to the Mines Branch testing plant, Ottawa, from Nova Scotia, Manitoba and the Mayo District, Yukon. A concentrating mill was erected in 1912 by the Scheelite Mines Limited, operating the Moose River properties in Nova Scotia and in 1916 a concentrating mill was erected at Burnt Hill, N.B., by the Acadia Tungsten Mines Company. The Burnt Hill mines were inspected in 1917 for the Munitions Resources Commission, Ottawa, and it was then reported that there was some tonnage of wolframite ore, but that the operators could not afford to produce concentrates at the official British price of 55 shillings per unit.

Scheelite was discovered near Falcon Lake, Eastern Manitoba, in March, 1918, and operations were carried on in the district during the year by a new company, the War Metals Production Company Limited. In 1918 it was also reported that the Cariboo Chisholm Creek Mining Company Limited, Van Winkle, B.C., had been operating the old deposit on Hardscrabble Creek in the Cariboo District.

The price of scheelite on the New York market was around \$26 per unit during January and February, 1918; with the signing of the armistice, business came to a complete stop and there were no quotations for November and December, 1918.

In 1939, for the first time in several years, commercial shipments of tungsten concentrates were made from a Canadian mine. These totalled 8,825 pounds valued at \$4,917 and were produced by Columbia Tungstens Company, Limited, at its property located at Wells, Cariboo Mining Division, British Columbia. Early in 1940 a shipment of tungsten concentrates was made by the Kirkpatrick Tungsten Syndicate from a deposit at Goff, Halifax County, Nova Scotia. Late in 1939 the tungsten property of the Indian Path Mines, Limited, located near Lunenburg, Nova Scotia, was optioned to Siscoe Gold Mines Limited who carried out diamond drilling and large scale bulk testing from the underground workings on the east and west ends of the property. In December, 1939, two shafts at North Waverley, Nova Scotia, were cleaned out to investigate scheelite occurrences explored there at the close of 1918. During the year under review both surface and underground work were carried out at the Lake Charlotte tungsten mines, Halifax County, Nova Scotia. These operations were conducted by Guysborough Mines Limited and extended from July 15 to the end of the year. In the province of Quebec a tungsten bearing deposit near Guigues was prospected by the Syndicate Minier de Gaboury.

It is also interesting to note that tungsten is reported to occur with gold in the veins of the Slave Lake Gold Mines Limited property, Outpost Island, Slave Lake, Northwest Territories; it is stated that recent sampling of the mine revealed encouraging tungsten values.

The principal use for tungsten is in the manufacture of high-speed tool steels. It is also employed in certain non-ferrous alloys and special alloy steels. Tungsten carbide cemented with cobalt is used extensively in industry and recent developments include several special grades, including combinations of tungsten carbide and tantalum carbide cement with cobalt or nickel or both, also combinations of tungsten carbide and titanium carbide cemented with cobalt. Tungsten is also utilized in the making of lamp filaments, radio tube filaments and contact points in electrical apparatus; in the chemical industry it is employed in the manufacture of certain types of dyes (lakes), and mordants.

China has been the principal world producer of tungsten ores and the production in that country has been adversely affected by the Sino-Japanese War. Exports in 1938 were 13,387 metric tons (60 per cent WO_3 basis) compared with 17,895 tons in 1937 according to the United States Bureau of Mines. It was reported early in 1939 that the Chinese Government had granted to the Peiping Syndicate, Limited, exclusive selling rights for Chinese tungsten ore, including the stocks in Hong Kong.

Output in Burma comes principally from the Herminggi and Mawchi mines. The ore reserves of the Mawchi mine are said to contain 3.24 per cent tin and tungsten; exports from Burma in 1938 were 10,598 metric tons.

"Metal and Mineral Markets", New York, quoted tungsten ore, January, 1939—per unit of WO_3 N.Y.: Chinese wolframite \$19.50, duty paid. Domestic scheelite, known good analysis, carload lots or more \$6.00 to \$19.00. Ferrotungsten per pound of tungsten contained 75 to 80 per cent tungsten \$1.60 to \$1.70. September, 1939: tungsten ore—per unit of WO_3 , N.Y.: Chinese wolframite nominal at \$23.75 duty paid. Domestic scheelite, carload lots \$25.00. Tungsten metal—per pound—98 per cent, powdered \$1.85; 99.5 per cent \$2.50 to \$2.75; 99.9 per cent \$5 nominal. Chinese tungsten ore was quoted May, 1940, per short ton unit of WO_3 —duty paid—New York \$23.00.

Table 171.—Imports into Canada of Specified Tungsten Products, 1938-1939

	1938		1939	
	Quantity	\$	Quantity	\$
Tungsten carbide*.....		720		246
Chromium metal and tungsten metal (a).....lb.	43,527	30,328	55,428	50,769
Metallie elements and tungstic acid for lamps.....		71,730		157,369

* From November 12, 1938.

(a) In lumps, powder, scrap alloy, etc., for alloying purposes.

Table 172.—Tungsten Wire Used in the Manufacture of Canadian Electrical Apparatus and Supplies, 1931-1939

Year	Value	Year	Value
	\$		\$
1931.....	79,659	1937.....	52,768
1932.....	53,802	1938.....	50,594
1933.....	48,701	1939.....	52,207
1934.....	48,996		
1935.....	52,192		
1936.....	47,856		

In 1938 there were 30 long tons of ferrotungsten valued at \$69,806 consumed in Canada in the manufacture of steel; in 1939 the quantity was 95 long tons valued at \$173,250.

Table 173.—World Production of Tungsten Ore and Concentrates, 1937, 1938 and 1939

(Supplied by the *Imperial Institute*)

(Long tons)

Producing Country	1937	1938	1939	Estimated WO ³ Content		
				1937	1938	1939
BRITISH EMPIRE						
United Kingdom—						
Concentrates.....	127	218		83	152	
Nigeria—						
Concentrates.....	8	44	240	5	31	
South West Africa—						
Wolfram.....	28	36	34	19	25	
Scheelite.....	9	8	8	5	5	
Southern Rhodesia—						
Concentrates.....	246	299	245	160	194	
Tanganyika Territory—						
Wolfram.....	2	3		1	2	
Uganda—						
Wolfram.....	1	1	1	1	1	
Union of South Africa—						
Tungsten ore.....	34	110	85	25	75	
Burma—						
Concentrates*.....	5,950	6,150		3,850	4,000	
Federated Malay States—						
Wolfram.....	27	29	26	19	20	
Scheelite.....	836	573	174	602	412	
India—						
Concentrates.....	13	10		8	6	
Unfederated Malay States—						
Wolfram.....	242	289	314	157	187	
Australia.....						
Wolfram.....	726	979		472	636	
Scheelite.....	12	40		8	26	
New Zealand—						
Concentrates.....	24	46	41	16	30	
FOREIGN COUNTRIES						
France—						
Tungsten ore.....	1	21			13	
Italy—						
Tungsten ore.....	5	7		2	3	
Norway—						
Wolfram.....	3	17		2	11	
Portugal—						
Concentrates.....	1,776	2,381	3,030	1,190	1,603	2,078
Tin-tungsten ores.....	90	138	99	33	57	24
Sweden—						
Tungsten ore.....	136	195		75	108	
Egypt—						
Tungsten ore.....	176	1,351		2	27	
Morocco (French)—						
Tungsten ore.....		6			4	
Mexico.....	30	69	107	20	45	
United States—						
Concentrates.....	3,125	2,718	3,217	1,875	1,631	
Argentina—						
Concentrates.....	752	1,037	1,137	520	700	800
Bolivia (exports)—						
Concentrates.....	1,774	2,490	1,176	1,064	1,494	1,970
Brazil (exports)—						
Tungsten ore.....	6	2	8	3	1	4
Chile—						
Concentrates.....	4	(a)		3	(a)	
Peru—						
Concentrates.....	70	157	157	17	100	97
China (exports)—						
Ore.....	16,257	12,163	10,520	10,567	7,906	
French Indo-China—						
Concentrates.....	571	879		383	571	
Japan—						
Scheelite.....	(a)	(a)		(a)	(a)	
Korea—						
Ore.....	1,900	(a)		1,230	(a)	
Netherlands East Indies—						
Concentrates.....			3			2
Siam—						
Concentrates.....	89	227	341	58	147	

Tungsten ores are also produced in U.S.S.R. and Spain.

(a) Information not available.

(b) Exports.

* Revised estimates.

VANADIUM

Some of the magnetites of the Rainy River district in Ontario are known to contain relatively small quantities of vanadium and some research has been conducted as to its economic recovery. There is no production of either the metal or its ores in Canada at the present time.

The principal occurrences of vanadium are in Arizona, Colorado and Utah in the United States; Minasragra in Peru; Broken Hill in Northern Rhodesia; and Grootfontein district in South West Africa.

The metal is employed chiefly in the manufacture of alloy steels and irons. It is also used in the form of ammonia meta-vanadate as a catalyst in the manufacture of sulphuric acid and in the nonferrous, glass, ceramic and colour industries.

Data relating to possible imports of vanadium ores or vanadium compounds or alloys are not shown separately in Canadian trade reports. In 1938 there were 11 tons of ferrovanadium valued at \$25,324 consumed in Canada in the manufacture of steel.

It was recently reported that vanadium may be recovered at German ferrous smelters from the treatment of pig iron made from vanadium bearing iron ores. Plant for the recovery of vanadium was completed in 1938 in Japan by the Japan Iron Sand Industrial Company.

"Metal and Mineral Markets", New York, quoted vanadium ore, January 12, 1939—per pound V_2O_5 contained, 27½ cents F.O.B. shipping point. Ferrovanadium, per pound of vanadium contained, delivered \$2.70 to \$2.90. These same prices were quoted May, 1940.

The United States Bureau of Mines reported that shipments of vanadium ores in the United States increased substantially in 1939. Shipments of vanadium and complex ores amounted to 273,000 tons as compared with 247,397 tons in 1938.

Table 174.—World's Production of Vanadium Ores, 1937, 1938 and 1939

(Supplied by Imperial Institute)

Long tons

Producing Country	1937	1938	1939
BRITISH EMPIRE			
Northern Rhodesia.....	232	368	378
South West Africa.....	583	549	904
FOREIGN COUNTRIES			
Argentina.....			14
Mexico.....	44	177	146
United States.....	485	720	886
Peru (exports).....	574	813	1,091

ZIRCONIUM

The metal is not produced in Canada; zircon is the most common zirconium mineral and the Department of Mines and Resources, Ottawa, states that it, or cyrtolite, commonly occurs in greater or less amount in Canadian Precambrian pegmatites, also in the pegmatitic apatite-phlogopite deposits of the Grenville areas in Ontario and Quebec.

"Mineral Industry" states—"Zirconium wire is used in radio tubes and sheet metal in spinneret cups for rayon manufacture. Zirconium-silicon and zirconium-ferrosilicon are finding a growing use in steel making and zirconium powder is used in flashlight mixtures and in ammunition primers; from a tonnage standpoint, however, the main uses of zirconium compounds are in enamels and for electrodes or welding-rod coatings, as a scavenger for oxides and nitrides in steel, and as a refractory."

According to Industrial and Engineering Chemistry, zirconium is used successfully in the form of zircon and sodium zirconium silicate in enamel and glaze frits, to produce opacity; as zirconium oxide it is used as a smelt in the frit and more recently as a mill addition opacifier.

Imports into Canada of zirconium silicate in 1939 were appraised at \$5,589 while those of zirconium oxide in the same period were valued at \$40,096 compared with \$24,983 in 1938. Data relating to possible imports of zirconium alloys are not published.

Zirconium alloy was quoted by "Metal and Mineral Markets", January, 1939—12 to 15 per cent zirconium, 39 to 43 per cent silica, \$97.50 to \$102.50 per gross ton; 35 to 40 per cent zirconium, 47 to 52 per cent silica, 14 to 16 cents per pound. Zircon ore per ton, 55 per cent ZrO_2 , F.O.B. Atlantic seaboard, earload lots, \$55; 5 ton lots, \$60. Crude granular zircon \$70, F.O.B. Suspension Bridge, New York; milled \$90. The same prices were quoted May, 1940.

Table 175.—Principal Statistics (*) of the Miscellaneous Metal Mining Industry in Canada, 1938 and 1939

	1938	1939
Number of firms.....	19	31
Capital employed (a).....	\$ 1,380,035	3,074,999
Number of employees—On salary.....	39	40
On wages.....	90	291
Total.....	129	331
Salaries and wages—Salaries.....	\$ 37,216	62,477
Wages.....	\$ 108,335	392,801
Total.....	\$ 145,551	455,278
Value of production (gross).....	\$ 8,909	524,977
Cost of fuel and electricity.....	\$ 10,749	92,405
Process supplies used.....	\$ 6,131	81,991
Smelter charges.....	\$	
Freight.....	\$ 26	1,177
Value of production (net).....	\$ -7,997	349,404

* Does not include data relating to smelters and refineries or to mining in the Northwest Territories.

(a) Exclusive of ore reserves.

Table 180.—Capital Employed in the Miscellaneous Metals Mining Industry in Canada, 1939

	\$
Present cash value of the land (excluding minerals).....	661,831
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,911,072
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	116,054
Inventory value of finished products on hand.....	4,258
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	381,784
Total.....	3,074,999

Table 181.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1939

	Number of employees		Salaries and wages
	Male	Female	\$
Salaried employees—			
Total.....	38	2	62,477
Wage-earners—			
Surface.....	229		392,801
Underground.....	33		
Mill.....	29		
Total.....	291		392,801
Grand Total.....	329	2	455,278

Table 182.—Average Number of Wage-Earners Employed, by Months, 1938-1939

	1938	1939		
		Surface	Under-ground	Mill
January.....	56	108	29	7
February.....	59	123	16	4
March.....	66	149	13	4
April.....	83	159	26	5
May.....	50	206	16	4
June.....	91	258	25	6
July.....	82	244	29	37
August.....	77	296	36	45
September.....	87	284	42	50
October.....	133	292	43	59
November.....	150	310	53	62
December.....	141	296	59	60

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

The Non-Ferrous Smelting and Refining Industry, as defined by the Dominion Bureau of Statistics, Ottawa, comprises those firms engaged primarily in the smelting of non-ferrous ores or concentrates and the refining of metals recovered therefrom.

The value added by the industry in the processing of crude or semi-crude material during 1939 totalled \$80,057,833 compared with \$87,091,374 in the preceding year. Refined products included gold, silver, copper, lead, zinc, aluminium, antimony, bismuth, cobalt, cadmium, selenium tellurium, radium salts, uranium compounds and sulphur; other end products of individual plants or companies were copper-nickel matte, cobalt salts, nickel salts, nickel and cobalt oxides, arsenious oxide, sulphuric acid, platinum metals residues, silver sulphide, zinc dust, zinc oxide, blister and anode copper and copper matte.

The cost of ores, concentrates and other material treated during 1939 was estimated at \$154,879,498 as against a corresponding value of \$173,070,377 in 1938; fuels and purchased electricity consumed totalled \$15,891,301 and the value of chemicals and various other process supplies used amounted to \$11,773,863.

Capital employed by the industry in 1939 was reported at \$192,186,465, which figure includes the value of land, plant, materials on hand and in process, finished products and operating funds. Employees totalled 12,449 and salaries and wages paid aggregated \$19,372,119 compared with 12,788 and \$19,549,963, respectively, in 1938.

Among the outstanding features in Canada's Mining Industry was an agreement made 1939 by the large base metal producers and the Imperial Government by which the producers were to supply the Imperial Government with copper, lead and zinc at prices which prevailed shortly before the outbreak of the war. Canada can now furnish large quantities of these metals in the refined form, whereas in 1914 no refined copper, nickel or zinc and only a comparatively small amount of refined lead were produced in this country.

There are two large aluminium smelters in Canada. One plant is at Shawinigan Falls, Quebec, and the other at Arvida, Quebec, the latter being one of the largest in the world. Both are owned by the Aluminum Company of Canada, Limited. Smelting and fabricating operations are combined in the works at Shawinigan Falls, Quebec. It was here, incidentally that the aluminium industry in Canada had its inception. Although bauxite is the largest single raw material for the production of aluminium, four tons being needed to make one ton of the metal, approximately three tons of other materials are also required. The most important of these are petroleum coke, metallurgical coke, cryolite, fluorspar, soda ash and fuel oil. Pitch, tar and a number of other miscellaneous supplies are also consumed. A large part of the aluminium production consists of aluminium alloys. For this, various alloying materials are required, such as silicon and ferro-silicon, manganese, titanium, zinc, and chromium. All bauxite used in the Canadian plants comes from British Guiana while petroleum coke is imported mainly from Gulf of Mexico and Great Lakes ports. Cryolite is obtained from Greenland. However, synthetic cryolite is being used in greater quantities each year. Fluorspar has been obtained mainly from Southern Europe. Of all electro-metallurgical operations, the production of aluminium consumes the most electricity, and it is because Canada has such resources of low cost hydro-electric power that the aluminium industry has been established here. Both the Arvida and Shawinigan plants were in continuous operation throughout 1939.

During 1939 the Noranda Mines Limited Smelter, at Noranda, Quebec, treated 1,335,298 tons of ore, concentrate and refinery slag and produced 107,358,107 pounds of anodes. After deducting the copper, gold and silver which was recovered from the slag received from Canadian Copper Refiners Limited, the estimated production of new metals was 105,363,477 pounds of fine copper, 318,599 ounces of gold and 967,943 ounces of silver. These figures include the production from 310,874 tons of customs ore and concentrate; the estimated recovery from Horne Mine ore being 83,257,148 pounds of fine copper, 266,532 ounces of gold and 595,102 ounces of silver.

With the completion of the extension of the tank house in December, the electrolytic copper refinery of Canadian Copper Refiners Limited, located at Montreal East, Quebec, was increased to approximately 100,000 tons of copper per annum and since the first of 1940, refinery production has been at the new rated capacity.

The smelter of Falconbridge Nickel Mines Limited, located at Falconbridge, Ontario, in 1939, treated 576,801 tons of ore comprising 332,724 tons of milling ore and 244,077 tons of smelting ore. Matte produced totalled 16,965.3 short tons containing 9,232.5 short tons of nickel and 4,691.9 short tons of copper. The refinery located in Norway operated steadily throughout the year.

International Nickel Company of Canada, Limited, reported that in 1939 ore smelting at the Copper Cliff Smelter was uninterrupted and 185,578 tons of bessemer matte and 165,129 tons of converter copper were produced. The Coniston Smelter ran continuously, processing 852,525 tons of ore and producing 50,587 tons of bessemer matte. At Port Colborne, Ontario, the nickel refinery produced 131,730,117 pounds of refined nickel, compared with 124,233,682 pounds in 1938. The Electrolytic Copper Refinery, at Copper Cliff, Ontario, received 165,129 tons of molten converter copper from the Copper Cliff smelter and produced 150,541 tons of refined copper; a second electric furnace was installed and brought into operation in January, 1939.

At Deloro, Ontario, the plants of the Deloro Smelting and Refining Company, Limited, were steadily operated throughout the year. Silver-cobalt ores from Northern Ontario were treated and products included fine silver, arsenic, cobalt, cobalt salts, cobalt oxide and nickel oxide.

Eldorado Gold Mines Limited, operated its refinery at Port Hope, Ontario, for approximately eleven and a half months during 1939. Shipments received at the refinery in 1939 amounted to 522 tons of pitchblende concentrates. In addition to this the refinery re-treated 160 tons of tailings from previous years. During the year a new product polonium was introduced to the market. Its present use is for the production of radioactive electrodes in the spark-plug industry. No material change was made in the process of refining radium and uranium.

At Flin Flon, Manitoba, a record tonnage of pay charge of Hudson Bay materials and custom concentrates were treated at the smelter of the Hudson Bay Mining and Smelting Company. There was smelted during 1939 a total of 341,325 tons of Flin Flon Mine concentrates and ore having the following assay value:—gold 0.362 ounces per ton; silver 5.36 ounces per ton and copper 9 per cent. There were shipped 44,805 tons of blister copper containing 142,656 ounces of gold; 2,141,785 ounces of silver; 88,501,247 pounds of copper and 64,692 pounds of selenium. There was treated in the zinc plant a total of 110,854 tons of zinc concentrates from which was produced for sale a total of 77,580,748 pounds of slab zinc. Metallic cadmium production for the year amounted to 140,438 pounds having an average assay of 99.9882 per cent cadmium. Custom concentrate and ore treated in 1939 totalled 61,890 tons.

In British Columbia the tonnage of lead ores smelted by the Consolidated Mining and Smelting Co. of Canada Ltd., in its plants at Trail, was an all time record in 1939 due to smelting a charge of lower lead content. The lead, silver and gold refineries at Trail operated very successfully during the year; refined lead production was down due to the ten per cent curtailment which ended on the 15th of September. Gold receipts at Trail in both bullion and high grade ores were lower. The new electrolytic parting plant in the silver refinery went into operation in December. Operations in the zinc plant were very satisfactory during the year and several new records were made. An antimony reduction plant was built to work up an accumulation of antimony arsenic flue dust; this plant made an excellent product. The percentage of sulphur dioxide removed from flue gases from metallurgical operations and utilized mainly in the production of sulphuric acid, sulphur and fertilizers, increased to 70.3 per cent compared with 53.3 per cent in 1937. The principal research investigations during the year included the use of oxygen in suspension roasting of zinc concentrates. Development of an improved process on a semi-commercial scale for the production of magnesium was successfully concluded. A process for the production of manganese has been practically completed and production of oil from tar sands was intensely studied. Compared with 1938 sales and deliveries of various products showed large increases in both tonnage and dollar value—\$35,000,000 against \$28,000,000.

Table 183.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1939

	\$
Present cash value of the land (excluding minerals).....	5,971,368
Present value of buildings, fixtures, machinery, tools and other equipment.....	120,271,072
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	29,899,443
Inventory value of finished products on hand.....	5,218,041
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	30,826,541
Total.....	192,186,465

DOMINION BUREAU OF STATISTICS

Table 184.—Principal Statistics of the Non-Ferrous Metallurgical Industry in Canada, 1938 and 1939

	1938	1939
Number of companies.....	10	9
Number of plants.....	13	13
Capital employed.....	184,337,126	192,186,465
Number of salaried employees.....	1,063	1,089
Salaries.....	\$ 2,612,284	2,670,414
Number of wage-earners.....	11,725	11,360
Wages.....	\$ 16,937,679	16,701,705
Value of plant products (gross) (†).....	\$ 287,295,733	262,602,495
Estimated cost of ores, concentrates, etc., treated (a).....	\$ 173,070,377	154,879,498
Cost of fuel and purchased electricity (b).....	\$ 15,233,547	15,891,301
Process supplies other than items (a) and (b).....	\$ 11,900,435	11,773,863
Value added by smelting (net).....	\$ 87,091,374	80,057,833

(†) The gross value of production should not be interpreted as the ultimate sale value of finished metal only, as it represents the combined values of all industry (smelting, refining, etc.) end products (blister, copper matte, etc.), and in this sense is a duplication of values.

Table 185.—Number of Wage-Earners, by Months, 1932 and 1938-1939

Month	1932	1938	1939
January.....	5,496	11,677	11,138
February.....	5,400	11,707	11,123
March.....	5,355	11,830	11,334
April.....	4,750	12,089	11,371
May.....	4,297	12,052	11,380
June.....	4,475	11,934	11,390
July.....	4,205	11,814	11,486
August.....	4,160	11,744	11,476
September.....	4,198	11,594	11,454
October.....	4,326	11,625	11,327
November.....	4,316	11,377	11,401
December.....	4,274	11,250	11,424
Average.....	4,604	11,725	11,360

Table 186.—Capacities of Canadian Copper Smelting and Refining Works, 1939 (a)

Company	Blast furnaces		Reverberatories		Converters	
	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates
Consolidated Mining & Smelting Co. of Canada Ltd. (b)						
Falconbridge Nickel Mines Ltd.....	1	400,000	1	75,000	2	16,000
Hudson Bay Mining & Smelting Co. Ltd.....					3	50,000
Noranda Mines Ltd.....			1	420,000	2	
International Nickel Co. of Canada, Ltd.....	4	800,000	2	1,100,000	4	230,000
			7	2,800,000	24	

(a) American Bureau of Metal Statistics.

(b) Idle.

ELECTROLYTIC COPPER REFINERIES		Annual capacity, short tons
Canadian Copper Refiners Ltd.....		100,000
International Nickel Co. of Canada, Ltd.....		150,000

Table 187.—Lead Smelting Capacity of Canada, 1939

Company	Situation of plant	Number of blast furnaces	Annual capacity (tons of charge)
Consolidated Mining & Smelting Co. of Canada, Ltd.....	Trail, B.C.....	5	700,000

LEAD REFINING CAPACITY IN CANADA, 1939

Company	Annual capacity for refined lead
Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B.C.....	200,000 short tons

The lead refining capacity of the world, as at the end of 1939, aggregated about 1,072,000 tons elsewhere, a total of 2,500,000 tons, is to be rated as useful and effective, the remainder being obsolete, incapable of economical ore supply, or otherwise useless. These accountings are exclusive of capacity in Russia.

Probably not more than 950,000 tons of the listed capacity in the United States and 1,550,000 tons elsewhere, a total of 2,500,000 tons, is to be rated as useful and effective, the remainder being obsolete, incapable of economical ore supply, or otherwise useless. These accountings are exclusive of capacity in Russia.

Official data for 1938 were not received from Spain, Germany and Japan, and for 1939 there was an absence of communication for other countries.

Table 188.—Capacity and Production of Electrolytic Zinc Plants in Canada, 1937-1939

Company	Maximum H.P. used	Estimated annual capacity for cathode zinc (short tons)	Actual production as ingot zinc (short tons)		
			1937	1938	1939
Consolidated Mining & Smelting Co. of Canada, Ltd.....	(a) 72,000	(b) 146,000	124,157	133,242	(c) 38,790
Hudson Bay Mining & Smelting Co. Ltd.....	22,500	43,000	34,486	38,414	

NOTE.—This statement supplied by the American Bureau of Metal Statistics.

(a) Expressed as power in terms of direct current after transforming the alternating current in sub-station at the works.

(b) Capacity for ingot zinc may be reckoned at 95% capacity for cathode deposition.

(c) Not recorded.

The American Bureau of Metal Statistics estimates the capacity of American zinc metallurgical works at the end of 1939 as being nominally for the production of about 600,000 short tons of spelter per annum by distilling, including the capacity in continuously operating vertical retorts, and about 214,000 tons by electrolysis, a total of about 814,000 tons, but the first-class effective capacity is probably something less than that. The effective capacity outside the United States at the end of 1939 is estimated at about 1,212,000 metric tons whereof about 330,000 tons were in Australia, Canada, Rhodesia and Great Britain.

CHAPTER SEVEN

THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA

The Coal Mining Industry in Canada.

The Coke and Gas Industry in Canada.

The Peat Industry in Canada.

The Petroleum Industry in Canada.

1. Production of Crude Petroleum.

2. Production of Petroleum Products.

NOTE.—In order to correlate data regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information regarding these industries as a whole, dealing principally with the mineral industry, although supplementary data are shown for closely allied manufacturing operations.

The Bureau issues an annual report on Coal Statistics for Canada which may be referred to for complete details of the Coal Mining Industry.

THE COAL MINING INDUSTRY

Canadian coal mines produced 15,692,698 tons of coal valued at \$48,676,990 during 1939; in the preceding year, 14,294,718 tons worth \$43,982,171 were produced while in 1937 the output totalled 15,835,954 tons at \$48,752,048. Bituminous coal output during 1939 amounted to 11,769,296 tons, sub-bituminous coal to 512,101 tons and lignite coal to 3,411,301 tons.

Nova Scotia's output rose 13·1 per cent in 1939 and aggregated 7,051,176 tons. Production from New Brunswick mines was 36·9 per cent higher at 468,421 tons. Manitoba produced 1,138 tons as against 2,016 tons in 1938. Saskatchewan operators reported an output of 960,000 tons or 6·1 per cent below the previous year's total of 1,022,166 tons. Alberta's production totalled 5,519,208 tons made up of 2,556,944 tons of bituminous coal, 512,101 tons of sub-bituminous coal and 2,450,163 tons of lignite coal. In 1938, Alberta mines produced 5,251,233 tons, consisting of 2,310,479 tons of bituminous coal, 488,915 tons of sub-bituminous coal and 2,451,839 tons of lignite coal. A 17·5 per cent increase was recorded in British Columbia's output in 1939 compared with the preceding year; the totals were, 1,692,755 tons and 1,440,287 tons, respectively. No coal was produced in Yukon during the year under review; in 1938, the output from this source was 361 tons.

Canadian coal exported in 1939 amounted to 376,203 tons; this represented an increase of 6·5 per cent over the tonnage exported a year ago. Ports in Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario cleared 226,065 tons of Canadian coal in 1939; exportations through the western ports totalled 150,138 tons. Canada re-exported foreign coal in 1939 to a total of 119,487 tons compared with 116,322 tons in 1938.

Imports of coal into Canada in 1939 were 4·5 per cent higher at 13,884,816 tons. Anthracite coal importations during the year amounted to 3,977,805 tons and consisted of 2,605,765 tons from the United States, 1,034,901 tons from Great Britain, 293,602 tons from Germany and 43,537 tons from French Indo-China. Great Britain supplied 26 per cent of the Canadian anthracite requirements in 1939 compared with 32·3 per cent in the preceding year and 46·5 per cent in 1934. The United States supplied 65·5 per cent of Canada's requirements of this coal during the year as against 53·1 per cent in 1938 and 51·0 per cent in 1934. Receipts of bituminous coal totalled 9,903,613 tons or 3·5 per cent above the 1938 total. Lignite coal imports amounted to 3,398 tons in 1939.

Employment was furnished by Canadian coal mines to 25,200 wage-earners, on the average; in 1938, the average number of those employed was 25,767. Mines in Nova Scotia and New Brunswick employed 14,319 wage-earners during the year while those in the western provinces employed 10,881 men. Surface workers averaged 257 days works in 1939 and underground workers, 220 days. In addition to these men, there were 1,272 salaried employees on the mine pay-rolls. All employees working in or about the Canadian coal mines received salaries and wages totalling \$30,720,991 in 1939 compared with a total pay-roll of \$28,699,781, a year ago.

Coal made available for consumption in Canada during the year amounted to 29,201,311 tons or 7.3 per cent above the tonnage made available in 1938. These figures do not represent the quantity consumed during the year but, are the actual tonnages of new coal made available for use in 1939. It was estimated that _____ tons of coal reached the Canadian market during the year.

It is not coal alone that satisfies Canada's fuel requirements; in addition, coke, natural and artificial gas, fuel oil, wood and electricity are used for industrial and domestic purposes.

In 1939, Canadian producers sold 1,085,946 tons of coke (made from coal) for domestic use; 799,653 tons were used in metallurgical works operated by producing companies; 232,027 tons were used by coke plants as fuel or to make water gas; 379,365 tons were sold for other uses and 66,262 tons were added to stocks. Imports of coke into Canada rose to 435,871 tons from the 1938 total of 414,682 tons. The manufacturers of coke and gas in Canada used 1,076,978 tons of domestic coal and 2,197,230 tons of imported coal in 1939.

The production of petroleum coke during the year amounted to 66,332 tons; imports totalled 147,505 tons and exports 7,396 tons. Domestic users consumed 32,710 tons of this coke in 1939 compared with 51,684 tons in the preceding year. On December 31, 1939 stocks of petroleum coke in the hands of fuel dealers, distributors, importers and in storage at refineries totalled 144,233 tons as against 94,089 tons at the end of 1938.

Artificial gas production in 1939 was made up of 34,655,444 thousand cubic feet from by-product ovens and 6,961,279 thousand cubic feet from gas plants. Of this quantity, 43.1 per cent or 14,936,102 thousand cubic feet was sold; most of the remainder was used in the producing plants or their associated metallurgical works. These figures do not include 39,470 thousand cubic feet of Pintsch gas used in lighting railway cars, 7,802,666 thousand cubic feet of still gas recovered and used at petroleum refineries, nor iron blast furnace gas and some producer gas, which was recovered and used by producers, for which no records are available.

Natural gas consumption in Canada during 1939 consisted of 19,900,000 thousand cubic feet for domestic use and 14,300,000 thousand cubic feet for industrial use. An apparent displacement of 796,000 tons of coal is indicated by the domestic consumption of natural gas.

Canada's supply of fuel and gas oils made available in 1939 amounted to 647.3 million imperial gallons as against 592.7 million imperial gallons, a year ago. The Canadian consumption of fuel oil in 1939 included 136.1 million gallons for domestic and building heating, 181.2 million gallons for industrial use, 204.9 million gallons for bunkering purposes, 53.8 million gallons for railways and 34.8 million gallons for tractor fuel. A possible coal displacement of 901,324 tons was indicated by the quantity of fuel oil used for domestic heating in 1939.

Table 189.—Capital Employed in the Coal Mines of Canada, by Provinces, 1938 and 1939

Province	1938				1939			
	Capital employed as represented by				Capital employed as represented by			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	35,928,287	3,575,722	5,077,169	44,581,178	33,216,566	3,453,405	8,151,120	44,821,091
New Brunswick...	628,675	33,159	217,532	879,366	776,612	37,874	392,420	1,206,906
Manitoba.....	4,000	100	500	4,600	3,000	100	500	3,600
Saskatchewan....	2,752,658	75,299	261,512	3,089,469	3,748,459	130,660	381,928	4,261,047
Alberta.....	30,005,646	652,481	6,542,583	37,200,710	29,811,382	821,006	6,333,786	36,966,174
British Columbia.	23,146,576	466,636	1,923,352	25,536,564	19,492,252	244,763	2,076,651	21,813,666
Yukon.....	203,000	250		203,250				
Canada.....	92,668,842	4,803,617	14,022,648	111,495,137	87,048,271	4,687,808	17,336,405	109,072,484

Table 190.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1939

Province	Average number of employees				Salaries and wages			
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
						\$	\$	\$
Nova Scotia.....	448	56	2,081	10,954	13,539	925,248	14,844,569	15,769,817
New Brunswick.....	35	7	284	1,000	1,326	78,875	1,005,509	1,084,384
Manitoba.....			1	3	4		2,232	2,232
Saskatchewan.....	54	5	211	456	726	83,153	533,625	616,778
Alberta.....	496	28	1,892	5,492	7,908	1,081,126	8,249,426	9,330,552
British Columbia.....	132	11	870	1,956	2,969	368,070	3,549,158	3,917,228
Yukon.....								
Canada.....	1,165	107	5,339	19,861	26,472	2,536,472	28,184,519	30,720,991

Table 191.—Wage-earners Employed and Days' Work Done, by Months, in the Coal Mines of Canada, 1939, with Comparative Totals for 1938

Month	Number of wage-earners			Days' work done		
	Surface	Under-ground	Total	Surface	Under-ground	Total
January.....	5,702	21,783	27,485	108,458	325,650	434,108
February.....	5,560	21,369	26,929	107,432	336,705	444,137
March.....	5,387	20,212	25,599	108,209	336,753	444,962
April.....	4,799	18,056	22,855	88,446	275,121	363,537
May.....	4,725	17,634	22,359	98,442	337,457	435,899
June.....	4,792	17,555	22,347	101,717	333,037	434,754
July.....	4,875	17,551	22,426	105,536	328,171	433,707
August.....	5,202	18,745	23,947	116,846	371,912	488,758
September.....	5,519	20,195	25,714	124,758	399,867	514,625
October.....	5,793	20,136	27,469	142,921	473,002	615,923
November.....	5,951	21,897	27,848	142,161	460,248	602,409
December.....	5,761	21,662	27,423	126,791	399,085	525,876
Total for 1939.....				1,371,687	4,367,008	5,738,695
Total for 1938.....				1,301,913	4,047,580	5,349,493

Table 192.—Output of Coal in Canada, by Grades, 1930-1939

Calendar year	Bituminous		Sub-Bituminous		Lignite		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$		\$
1930.....	10,824,839	41,789,061	603,358	1,705,236	3,453,127	9,355,451	14,881,324	52,849,748
1931.....	8,861,360	33,165,730	471,343	1,211,197	2,910,508	6,830,755	12,243,211	41,207,552
1932.....	7,714,279	28,073,744	560,902	1,329,316	3,463,732	7,714,635	11,738,913	37,117,695
1933.....	7,979,283	27,757,150	554,118	1,274,017	3,369,943	6,892,795	11,903,344	35,923,962
1934.....	10,058,782	34,356,274	537,508	1,256,936	3,213,903	6,432,732	13,810,193	42,045,942
1935.....	9,748,841	33,150,781	566,425	1,410,926	3,572,740	7,401,403	13,888,006	41,963,110
1936.....	10,796,135	36,256,347	566,235	1,432,741	3,866,812	8,102,846	15,229,182	45,791,934
1937.....	11,634,379	39,661,259	506,260	1,314,196	3,695,315	7,776,593	15,835,954	48,752,048
1938.....	10,329,782	35,403,781	488,915	1,269,131	3,476,021	7,309,259	14,294,718	43,982,171
1939.....	11,769,296	40,119,905	512,101	1,323,401	3,411,301	7,233,684	15,692,698	48,676,990

Table 193.—Output and Value of Coal in Canada, by Kinds and by Provinces
1938 and 1939

(Short tons)

Province	1938			1939		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	41	6,236,417	22,523,802	40	7,051,176	25,611,271
NEW BRUNSWICK (Bituminous).....	22	342,238	1,133,346	34	468,421	1,566,359
MANITOBA (Lignite).....	2	2,016	5,660	1	1,138	3,110
SASKATCHEWAN (Lignite).....	*134	1,022,166	1,380,416	*136	960,000	1,255,862
ALBERTA—						
Bituminous.....	17	2,310,479	6,506,156	18	2,556,944	7,117,168
Sub-bituminous.....	20	488,915	1,269,131	19	512,101	1,323,401
Lignite.....	239	2,451,839	5,923,183	238	2,450,163	5,974,712
Total.....	†276	5,251,233	13,698,470	†275	5,519,208	14,415,281
BRITISH COLUMBIA (Bituminous).....	22	1,440,287	5,237,077	24	1,692,755	5,825,107
YUKON (Bituminous).....	1	361	3,400			
CANADA—						
Bituminous.....	103	10,329,782	35,403,781	116	11,769,296	40,119,905
Sub-bituminous.....	20	488,915	1,269,131	19	512,101	1,323,401
Lignite.....	375	3,476,021	7,309,259	375	3,411,301	7,233,684
Total.....	498	14,294,718	43,982,171	510	15,692,698	48,676,990

* Exclusive of 33 small mines in operation during part of 1938 and 35 small mines operating during part of 1939.

† Exclusive of 39 small mines operated under special permits in 1938 and 30 small mines in 1939.

Table 194.—World Production of Coal* 1937, 1938 and 1939

(Including brown coal)

(Long tons)

Country	1937	1938	1939	Country	1937	1938	1939
BRITISH EMPIRE				Netherlands—			
Great Britain—				Bituminous.....	14,095,084	13,274,508	12,658,370
Anthracite.....	6,335,776	6,278,140	†	Brown coal.....	140,798	167,942	
Bituminous.....	234,073,660	220,737,168	†				
Northern Ireland.....	1,203	350	†	Poland—			
Eire—				Bituminous.....	35,646,160	37,502,220	†
Anthracite.....	104,966	90,701	89,026	Brown coal.....	18,616	9,376	†
Semi-bituminous.....	20,958	27,751	28,732	Portugal—			
Nigeria.....	363,181	362,516	1,099,879	Anthracite.....	228,260	277,290	245,138
Southern Rhodesia.....	1,013,086	1,027,342	1,099,879	Bituminous.....	17,168	16,581	18,031
Union of South Africa.....	15,246,129	16,026,987	16,623,533	Brown coal.....	22,439	14,619	35,598
Canada—				Roumania—			
Bituminous.....	10,387,838	9,223,020	10,508,300	Anthracite.....	3,588	3,214	4,331
Sub-bituminous.....	452,018	436,531	457,233	Bituminous.....	294,657	290,907	263,562
Lignite.....	3,299,388	3,103,590	3,045,804	Brown coal.....	1,616,921	1,793,350	1,873,700
British Borneo—				Lignite.....	233,856	270,236	270,477
Brunei.....	444	464	32	Russia—			
Federated Malay States.....	627,890	477,908	441,025	Anthracite.....	120,643,000	130,300,000	121,450,000
India—				Bituminous.....			
Gondwana Coal-fields.....	24,751,343	27,823,951	27,767,492	Lignite.....			
Tertiary Coal-fields.....	465,043	518,955	-	Spain—			
Used by Miners.....	626,000	709,000	-	Anthracite.....	-	-	653,112
Australia—				Bituminous.....	-	-	5,993,303
Bituminous.....	12,074,274	11,680,159	†	Lignite.....	-	-	201,033
Lignite.....	3,393,919	3,675,450	†	Spitzbergen and			
New Zealand—				Bear Island.....	754,035	616,623	†
Bituminous.....	969,984	977,850	1,044,609	Sweden.....	453,193	424,222	†
Brown coal.....	1,186,320	1,112,414	1,159,963	Switzerland (b).....	4,000	3,000	†
Lignite.....	121,495	131,824	138,067	Algeria.....	13,997	12,979	†
Total British Empire.....	315,000,000	304,000,000	-	Belgian Congo.....	35,917	40,618	†
FOREIGN COUNTRIES				Morocco (French)—			
Albania—				Anthracite.....	105,458	100,000	†
Lignite.....	4,000	4,000	†	Mozambique.....	18,890	18,364	†
Austria—				Greenland.....	6,000	†	†
Bituminous.....	226,584	222,000	†	Mexico.....	897,629	879,035	618,176
Brown coal.....	3,190,571	3,477,000	†	United States—			
Belgium—				Anthracite.....	46,300,387	41,159,846	45,363,000
Anthracite and semi-anthracite.....	6,588,307	6,765,946	29,375,500	Bituminous and lignite.....	397,795,937	307,705,000	347,344,000
Bituminous.....	22,799,348	22,351,652	†	Brazil.....	750,742	871,023	1,029,916
Bulgaria—				Chile.....	1,969,384	2,028,852	1,852,479
Anthracite.....	2,502	3,937	†	Colombia.....	325,000	855,000	†
Bituminous.....	116,021	136,041	†	Peru—			
Lignite.....	1,704,763	1,825,898	†	Anthracite.....	2,872	1,476	†
Czecho-Slovakia—				Bituminous.....	94,605	72,779	†
Bituminous.....	16,512,541	13,300,000	†	Venezuela (c).....	11,737	5,601	†
Brown coal.....	17,612,727	12,900,000	†	China.....	†	†	†
France—				Netherlands			
Anthracite and bituminous (a).....	43,618,141	45,762,612	46,809,000	East Indies.....	1,341,971	1,433,641	1,752,509
Lignite.....	999,522	1,040,552	†	Formosa.....	†	†	†
Germany—				French Indo-China—			
Bituminous.....	181,598,670	183,238,362	†	Anthracite.....	2,229,206	2,249,500	†
Brown coal.....	181,791,547	191,898,839	†	Bituminous.....	42,348	53,800	†
Greece—				Brown coal.....	-	4,100	†
Lignite.....	120,013	106,304	†	Lignite coal.....	-	-	†
Hungary—				Japan—			
Bituminous.....	902,545	921,880	†	Semi-anthracite and bituminous.....	†	†	†
Brown coal.....	7,927,904	9,211,880	†	Brown coal.....	†	†	†
Lignite.....	140,919	†	†	Karafuto.....	2,495,528	†	†
Lignite (dehydrated).....	140,919	†	†	Korea—			
Italy—				Anthracite.....	2,311,000	†	†
Anthracite.....	93,559	130,109	100,000	Lignite.....	†	†	†
Bituminous.....	855,054	2,185,904	1,041,290	Manchuria.....	†	†	†
Brown coal.....	1,042,502	439,070	1,894,600	Philippine Islands.....	21,185	38,333	†
Jugoslavia—				Turkey—			
Bituminous.....	432,405	4,401,672	4,244,118	Bituminous.....	2,270,435	2,519,000	2,650,000
Brown coal.....	3,475,749	1,249,478	1,289,063	Lignite.....	113,252	142,298	158,027
Lignite.....	1,046,889	-	-	Total Foreign countries.....	1,200,000,000	1,120,000,000	-
				Grand Total.....	1,510,000,000	1,420,000,000	-

* Data obtained from *The Mineral Industry of the British Empire and Foreign Countries*.

† Information not available.

(a) Includes about 6,000,000 tons of anthracite each year.

(b) United States Bureau of Mines estimate.

(c) Excluding production in government owned mines.

THE COKE AND ARTIFICIAL GAS INDUSTRY

The output from coke and gas plants in 1939 included 2,410,095 tons of coke valued at \$16,763,517 (at the works), 41,632,773 thousand cubic feet of gas, of which 41,616,723 thousand cubic feet valued at \$19,160,900 were sold or used, and by-products valued at \$3,105,153.

Thirty coke and gas works operated in 1939, including 8 by-product plants, 2 bee-hive plants and 20 retort coal and water gas plants. Sixteen of these works were located in Ontario, 4 in British Columbia, 4 in Quebec, 2 in Manitoba, 2 in Nova Scotia and 1 in each of New Brunswick and Alberta. In addition to these producers, one company in Quebec and two in Ontario purchased coke-oven gas and distributed it for domestic or commercial use and data covering their operations have been included to round out the figures for the industry.

Output of coke from gas retorts, by-product and bee-hive ovens, totalled 2,410,095 tons in 1939 compared with 2,352,003 tons in 1938 and 2,570,385 tons in 1937. By-product and bee-hive ovens produced 2,147,210 tons of coke in 1939 and gas retorts made 262,885 tons. In addition, 66,332 tons of petroleum coke were recovered in petroleum refineries.

Data on the distribution of coke (except petroleum coke) by the producers show that 313,237 tons were sold direct to domestic consumers, 799,653 tons were used in metallurgical works operated by the producing companies, 232,027 tons were used by coke plants as fuel or to make water gas, 379,365 tons were sold direct to consumers for foundry and other uses (other than domestic) and 772,709 tons were sold to dealers for resale. The total distribution was 2,496,991 tons, including about 67,000 tons withdrawn from producers' stocks during the year. Total stocks of coke in the hands of the producers amounted to 311,077 tons at the end of 1939.

Imports of coke made from coal advanced to 435,871 tons in 1939 from 414,682 tons in 1938 and exports to 48,719 tons from 30,537 tons. Imports of petroleum coke during this period also rose to 147,690 tons from 81,294 tons and exports to 35,604 tons from 25,408 tons.

Manufactured gas, sold and used, amounted to 41,616,723 thousand cubic feet in 1939, including 34,655,444 thousand cubic feet from by-product ovens and 6,961,279 thousand cubic feet from gas plants. Sales of gas by the producers totalled 14,936,102 thousand cubic feet, of which 8,688,352 thousand cubic feet were from by-product ovens and 6,247,750 thousand cubic feet were from gas works. Most of the remaining gas was used as a fuel in the producing plants or in their associated metallurgical works. These figures do not include 39,470 thousand cubic feet of (Pintsch) oil gas for lighting railway cars, 7,802,666 thousand cubic feet of still gas recovered at petroleum refineries, nor iron blast furnace gas and some producer gas which was recovered and used by the producers but for which no records are available.

The number of customers served with manufactured gas in 1939 was 477,475, the number of active meters was 497,039, the length of distributing mains was 3,882 miles, and the average calorific value of the gas sold ranged from 450 to 570 B.T.U. per cubic foot.

Table 195—Materials Used in Coke and Gas Industry in Canada, 1938 and 1939

Materials	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
		\$		\$
Bituminous coal carbonized in ovens or retorts—				
(a) Canadian.....	short ton 1,008,895	4,256,564	1,076,978	4,592,536
(b) Imported.....	short ton 2,215,469	10,784,493	2,194,348	10,672,863
Bituminous coal for making water gas—				
Imported.....	short ton 3,650	27,191	2,882	21,449
Coke for gas-making—				
(a) Purchased.....	short ton 4,150	39,351	6,339	53,483
(b) Companies' own make.....	short ton 87,923	606,880	79,953	530,179
Oil used for enriching water gas.....	imp. gal. 4,358,714	327,027	4,028,892	299,033
Absorbing and wash oil.....	imp. gal. 243,089	26,956	201,602	21,777
Caustic soda.....	pound 745,762	12,084	720,632	10,666
Lime.....	ton 2,396	23,724	2,168	21,592
Water.....	\$ —	17,341	—	14,848
Oxide or purifying materials.....	\$ —	41,013	—	35,417
Sulphuric acid, 66° Bé.....	pound 43,713,138	317,195	45,729,750	320,002
All other materials.....	\$ —	123,824	—	132,600
Total Cost.....	—	16,603,643	—	16,726,445

Table 196—Production in Canada, Imports and Exports of Coke and Its By-Products, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
		\$		\$
Coke				
PRODUCTION—by provinces—				
Nova Scotia, New Brunswick and Quebec..... tons	754,975	5,040,400	802,072	5,583,317
Ontario..... tons	1,365,571	10,339,065	1,379,942	9,712,164
Manitoba, Alberta and British Columbia..... tons	231,457	1,515,602	228,081	1,468,036
Total..... tons	2,352,003	16,895,067	2,410,095	16,763,517
IMPORTS..... tons	414,682		435,871	
EXPORTS..... tons	30,537	197,640	48,114	315,699
AVAILABLE FOR CONSUMPTION..... tons	2,736,148		2,797,852	
Other Products				
PRODUCTION—				
Ammonium sulphate..... tons	28,128	671,762	28,664	683,977
Gas: Sales..... M cu. ft.	15,198,068	15,001,142	14,936,102	14,562,246
Used in own plants..... M cu. ft.	16,890,810	2,365,330	15,732,194	2,206,196
Used in associated metallurgical works..... M cu. ft.	9,259,954	1,122,106	9,377,343	1,204,936
Gas otherwise accounted for, but not sold..... M cu. ft.	228,899	61,278	231,514	74,625
Not accounted for..... M cu. ft.	1,488,650	1,161,415	1,339,570	1,112,897
Benzol..... imp. gal.	3,292,058	511,276	2,813,014	417,146
Toluol and xylol..... imp. gal.	3,223,959	399,578	3,810,145	472,662
Other light oils..... imp. gal.				
Tar..... imp. gal.	26,081,011	1,417,750	27,077,070	1,515,071
Ammonia liquor..... pound N.H. ₃	1,482,646	14,826		16,297
IMPORTS—				
Ammonium sulphate..... tons	5,911	156,540	3,217	94,854
Coal tar and pitch.....		290,186		296,554
EXPORTS—				
Ammonium sulphate..... tons	77,191	1,697,204	109,260	2,508,364
Coal tar and pitch..... gal.	5,020,939	254,358	1,875,385	101,255

NATURAL GAS INDUSTRY

The output of natural gas in Canada in 1939 totalled 35,185,146 thousand cubic feet or 5.2 per cent above the 1938 total. This production includes only the natural gas consumed for industrial and domestic purposes and does not take into account the waste gas burned in the Turner Valley field and the gas piped to the Bow Island field for repressuring.

Wells in New Brunswick produced 606,382 thousand cubic feet compared with 577,492 thousand cubic feet in 1938. Approximately 5,900 consumers in Moncton and Hillsboro were supplied with gas from wells in the Stoney Creek field, near Moncton. There were 39 wells in operation in this province at the end of 1939.

Ontario's output rose 9.3 per cent to 11,966,581 thousand cubic feet from the 1938 production of 10,952,806 thousand cubic feet. Developments in this province in 1939 were summarized, by Col. R. B. Harkness, Commissioner of Gas for Ontario, as follows:

"The year 1939 has again seen a major increase in the natural gas industry in Ontario, the production having exceeded that of 1938 by slightly over 1,000,000 thousand cubic feet.

"The number of consumers shows an increase of just under 4,000, which is the normal rate of increase for the past three years. Natural gas service has been extended to a few villages in the vicinity of the Brownsville field, and the villages along the pipe line from the Dawn gas field to London are now supplied with natural gas. The town of Picton in Prince Edward county is also supplied with a limited quantity of natural gas from wells adjacent to and inside the town limits. These customers used more gas than they did in the year 1938 but paid the same rates for their gas. The greater part of the increase in consumption was in industry; late in the year, the demand for natural gas for manufacturing munitions of war showed a marked increase in each month. This demand has continued to multiply each month in 1940 and promises to parallel conditions in 1917, in which year 9,125,752 thousand cubic feet was used in industry. The 1939 industrial consumption was 2,503,954 thousand cubic feet.

"The development of the Brownsville field has led to a widespread search in that area. The Union Gas Company has been successful in discovering another gas field in the same formation that shows great promise. They now have 26 producing wells with a total open flow of 30,556 thousand cubic feet. Exploratory drilling has spread to Delaware, London, Blenheim, Southwold, Malahide, and Yarmouth townships. The Union Gas Company has also done a considerable amount of exploratory work in Kent county, particularly in Chatham and Dover townships and Camden gore. In Chatham township the company now has 9 producing wells, which, as yet, have not been turned into their transmission mains.

"In the Haldimand and Welland fields drilling activity in 1939 was about the same as in 1938, except in Bertie township, where 31 wells were drilled in 1939 as against 10 wells in 1938. Within this field, now 50 years old, there are still small areas where the gas has not yet been exhausted. In many instances these areas are outlined and drilled by a study of the rock pressures of the old wells. Although the wells are small as compared with other gas fields, the high retail price in Welland county makes this exploration profitable.

"Further exploratory drilling was carried out in Prince Edward county, where 6 small producers were completed.

"The Haldimand gas field, after declining in production from 1912 to 1925, has shown an increase nearly every year since 1925 and now equals its production of 20 years ago. The number of producing wells in Haldimand in 1919 was 720 and their average production 3,250 thousand cubic feet. In 1939 there were 1,602 producing wells in Haldimand, and the average production was 1,317 thousand cubic feet. The wholesale price of gas in this field is at present about 30 cents per thousand cubic feet an average gross return per well of \$394.10, which is not a great deal today to cover the costs of drilling, operation, and maintenance of a gas well and the return to the owner of his investment and a profit.

"The Welland field shows a slight increase, due no doubt to the 24 new wells drilled. This increase is not enough, however, to offset the average annual decline. This field, now 50 years old, will still maintain a diminishing production for a number of years. The present average annual production per well is 945 thousand cubic feet.

"The Elgin county fields show a considerable drop in production. This is due mainly to operating conditions, which necessitated an increase in pipe line pressure, which in turn restricted the delivery of the gas from the wells. In addition to this, considerable trouble was encountered in operating the wells, owing to salt accumulations in some wells and the intrusion of salt water into others.

"The Tilbury field appears to be showing a steady annual decline. This may be offset for a few years by the use of compressors, which were in operation for part of 1939. More compressors are being installed in 1940.

"The Declute field has been showing an increased annual production since it was discovered. Water came into the wells in the west end of the field some years ago, and at the end of 1939 the wells in the extreme east end of the field suddenly went to water. It is therefore probable that the production of the year 1939 or 1940 may be the peak.

"The Dawn field has also shown a steady increase in production. Unlike the Declute field, no water has appeared in the Dawn field but the pressure has shown a considerable decline. This field, however, is not drawn on as extensively as the Declute field.

"Considerable mechanical difficulties were encountered in operating the gathering lines and transmission lines in and from the Brownsville field during the winter of 1939-40, from the natural gas hydrates in these high pressure lines. This same difficulty is well known in the industry, but in this instance the trouble was accentuated by reason of the small size of the pipe lines and fittings as well as the lack of sufficient fittings and drips. Most natural gas contains some moisture, and under high pressure this appears to combine with the hydrocarbon vapours of low boiling point to form solids. This 'freezing' occurs at low points in the pipe lines and at valves, drips, and places where the gas flow is retarded.

"The freezing in the pipe lines can only be remedied by removing the hydrates and moisture or heating the gas. At well heads and drips this cannot be done, and the consequent freezing puts a heavy burden on the operating crew. Where the pipe line is not entirely blocked, alcohol

may be introduced into the line on the upstream side of the block and the hydrates dissolved; where possible, heat should be applied by building a fire in the trench. The application of heat at well heads is the quickest way to remedy the matter, followed by protection to the well head by wrapping with insulating material. Gas should be heated before it passes through a regulator or orifice meter. Another effective means of dealing with this problem is by inserting a calcium chloride dryer or other moisture absorber, in the pipe line.

"Where pressures are low and pipe lines large or volumes small, very little trouble is encountered from freezing. The hydrates are present and the pipes will be found to be lined with a sort of hoar frost, which undoubtedly reduces the capacity of the line, but a few warm days will decrease or eliminate this trouble. Where the pressures carried are high, a 'frozen' pipe may not thaw out until the temperature of the pipe reaches 40 to 50 degrees Fahrenheit, depending on the nature of the hydrates."

There were 191 operating, distributing and drilling firms active in the natural gas industry in Ontario during 1939. These firms reported a total capital investment of \$49,936,462. Employment was furnished by this industry to 1,414 salaried employees and wage-earners.

Saskatchewan produced 96,423 thousand cubic feet of natural gas in 1939 compared with 90,285 thousand cubic feet in the preceding year. The 1939 output was used principally to supply customers in Lloydminster.

Natural gas production in Alberta totalled 22,513,660 thousand cubic feet in 1939; a year ago, 21,822,108 thousand cubic feet were produced. As stated before, these figures include only the natural gas consumed for industrial and domestic purposes and do not take into account the waste gas burned in the Turner Valley field and the gas piped to the Bow Island field for storage.

The Turner Valley field is the largest natural gas producing area in Canada; this field is located about 35 miles southwest of Calgary. Industrial and domestic users consumed 15,693,314 thousand cubic feet of Turner Valley gas in 1939; in the previous year, 15,333,488 thousand cubic feet were used. Approximately 24,300 consumers in Calgary, Lethbridge and the district were served with this gas in 1939; in addition, a considerable quantity was used in the field for drilling purposes. A small quantity of Turner Valley gas was piped to the Bow Island field, during the year, for repressuring wells in that area. Since 1930, about 13,944,000 thousand cubic feet of this gas has been piped into these wells.

Approximately 2,600 consumers in the city of Medicine Hat were supplied with gas from the Medicine Hat field. The total consumption of gas in this city was 2,127,802 thousand cubic feet as against 1,999,404 thousand cubic feet in 1938. The Redcliff field supplied 282 industrial and domestic users with 626,861 thousand cubic feet of gas in 1939. This field is located about two miles west of Medicine Hat.

Edmonton obtains its supply of gas from the Viking field, which is situated about 80 miles southeast of the city. In 1939, gas was supplied by this field for 11,500 consumers in Edmonton and 500 users outside the city. Twenty-one wells were in operation in the Viking field during the year.

In Alberta, on December 31, 1939, there were 96 wells producing natural gas *only* compared with 97 wells a year ago. Capital employed by the companies operating in this industry in Alberta during the year was \$26,544,265 as against \$26,057,961 in 1938. The industry employed 485 persons who received salaries and wages totalling \$725,152. The cost of fuel and electricity used during the year was \$8,266.

At Fort Norman, in the Northwest Territories, 1,500 thousand cubic feet of natural gas were used for power purposes.

Canada imported 114,396 thousand cubic feet of mixed gas (natural and artificial) by pipe line from the United States during 1939; this gas was valued at \$75,380. In 1938, importations totalled 133,062 thousand cubic feet worth \$87,311.

The Canadian natural gas industry in 1939 was represented by 222 operators who reported a total capital employment of \$78,409,338. These operators employed 1,990 salaried employees and wage-earners who received a total remuneration of \$2,536,220. Fuel and electricity used during the year cost \$82,877.

Table 197.—Production of Natural Gas in Canada, by Provinces, 1930-1939

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1930.....	661,975	325,751	7,965,761	5,034,828	600	180	20,748,583	4,929,226	29,376,919	10,289,985
1931.....	655,891	323,184	7,419,534	4,635,497	600	180	17,798,698	4,067,893	25,871,723	9,026,754
1932.....	662,452	326,191	7,386,154	4,719,297	600	180	15,370,968	3,853,794	23,420,174	8,899,462
1933.....	618,033	302,706	7,166,659	4,523,085	600	180	15,352,811	3,886,263	23,135,103	8,712,234
1934.....	623,601	306,005	7,682,851	4,741,368	600	180	14,841,491	3,707,276	(a)23,162,324	(a)8,759,652
1935.....	615,454	303,886	8,158,825	4,938,084	600	180	16,060,349	4,113,436	(b)24,910,786	(b)9,363,141
1936.....	606,246	298,819	10,006,743	6,052,294	600	180	17,407,820	4,376,720	(c)28,113,348	(c)10,762,243
1937.....	576,671	283,922	10,746,334	6,588,798	600	180	20,955,506	4,766,437	(d)32,380,991	(d)11,674,802
1938.....	577,492	284,689	10,952,806	6,460,764	600	180	21,822,108	4,807,346	(e)33,444,791	(e)11,557,450
1939.....	606,382	292,403	11,966,581	7,261,928	600	180	22,513,660	4,915,821	(f)35,185,146	(f)12,507,307

(a) Includes production in Saskatchewan of 13,781 M cu. ft. at \$4,823.

(b) Includes production in Saskatchewan of 75,558 M cu. ft. at \$7,555.

(c) Includes production in Saskatchewan of 90,839 M cu. ft. at \$33,985 and in the Northwest Territories of 1,100 M cu. ft. at \$245.

(d) Includes production in Saskatchewan of 100,380 M cu. ft. at \$35,130 and in the Northwest Territories of \$1,500 M cu. ft. at \$335.

(e) Includes production in Saskatchewan of 90,285 M cu. ft. at \$34,136 and in the Northwest Territories of 1,500 M cu. ft. at \$335.

(f) Includes 96,423 M cu. ft. at \$36,640 in Saskatchewan and 1,500 M cu. ft. at \$335 for Northwest Territories.

Table 198.—Production of Natural Gas in Canada, by Months, 1939

	New Brunswick	Ontario	(a) Manitoba	Saskatchewan	Alberta	Canada
	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.
January.....	72,704	1,430,525	50	12,923	2,578,073	4,094,275
February.....	71,204	1,390,692	50	16,632	2,611,943	4,090,521
March.....	70,505	1,381,162	50	11,566	2,238,624	3,701,907
April.....	66,853	1,297,763	50	7,380	1,760,355	3,132,401
May.....	53,577	797,258	50	4,137	1,254,235	2,109,257
June.....	42,053	597,365	50	3,697	1,449,161	2,092,327
July.....	29,788	461,707	50	2,317	1,249,294	(b)1,743,656
August.....	23,390	564,037	50	2,626	1,287,357	(b)1,877,960
September.....	26,811	611,663	50	4,170	1,442,370	(b)2,055,564
October.....	39,566	850,967	50	8,858	1,904,629	2,804,070
November.....	54,064	1,169,392	50	10,768	2,226,875	3,461,149
December.....	55,807	1,414,049	50	11,349	2,510,744	3,992,059
Total.....	606,382	11,966,581	600	96,423	22,513,660	35,185,146

(a) Estimated.

(b) Includes production from Fort Norman, Northwest Territories.

Table 199.—Natural Gas Production in Ontario, by Fields, 1938 and 1939 (a)

County	Field	1938	1939
		M cu. ft.	M cu. ft.
Essex.....	Kingsville.....	3,265,726	3,097,557
Kent.....	Tilbury.....	1,797,789	2,182,437
	Declute.....		
Lambton.....	Dover.....	509,677	433,496
	Dawn and Oil Springs.....	1,894,730	2,148,472
Oxford.....	Brownsville Field/Dereham.....	506,005	842,511
Elgin.....	Bayham.....	50,917	267,129
Elgin.....		113,651	59,554
Norfolk.....	Norfolk.....	437,867	362,780
Lincoln.....	Lincoln.....	1,912,882	2,109,935
Haldimand.....	Haldimand.....		
Wentworth.....	Wentworth.....	135,348	108,640
Onondaga.....	Onondaga.....		
Brant.....	Amabel.....	1,129	.....
Bruce.....	Welland.....	253,085	279,696
Welland.....	Hallowell.....	.....	374
Prince Edward.....	Howard and Harwich.....	14,000	14,000
Wells in surface drift.....	.....	60,000	60,000
Private wells.....	.....	.....	.....
Total produced.....	.....	10,952,806	11,966,581
Value.....	.....	6,460,763	7,261,927
Imported mixed gas.....	.....	125,807	107,946
Total distributed.....	.....	11,078,613	12,074,527

(a) Prepared by the Ontario Department of Mines.

Table 200.—Number of Gas Wells in Canada, by Provinces, 1937-1939

	New Brunswick	Ontario	Manitoba	Saskatchewan	Alberta	Canada
Productive wells at beginning of year....1937	35	3,055	5	1	95	3,191
.....1938	37	3,065	5	3	100	3,210
.....1939	36	3,122	4	3	96	3,261
Number of productive wells drilled....1937	2	135				137
.....1938	2	114			1	117
.....1939	3	142				145
Number of dry wells drilled.....1937	1	66			2	69
.....1938		53				53
.....1939	2	63				65
Number of wells abandoned.....1937		98				98
.....1938	3	89			1	93
.....1939		84				84
Productive wells at end of year.....1937	37	3,065	5	3	100	3,210
.....1938	36	3,122	5	3	97	3,263
.....1939	39	3,163	4	3	96	3,305

Table 201.—Natural Gas Wells in Ontario, by Townships, 1938 and 1939

Township	1938				1939			
	No. of producing wells in operation Dec. 31, 1937	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1938	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Amabel.....	7	4				1		
Ancaster.....		1						
Bayham.....	50		3	13	63	6	1	4
Bertie.....	101	3	1	9	108		7	24
Binbrook.....	52	1			50			
Blanshard.....			1					
Blenheim.....							1	
Caistor.....	62	3		4	63	1		
Camden Gore.....							3	
Canboro.....	166	10			153	6		1
Cayuga, North.....	198	7	1	1	194	2	1	3
Cayuga, South.....	49	1			56			
Charlotteville.....	15	2			13		2	1
Chatham.....								
Crowland.....	24				26			1
Dawn.....	23		3		23		2	
Delaware.....			1				1	
Dereham.....	44	1		14	58	4	2	7
Dorchester, South.....		2						
Dover, East.....	19	1		1	21	1	2	
Dover, West.....								
Dunn.....	49	2	1		49		5	2
Dunwich.....			2					
Enniskillen.....	2				1		1	
Euphemia.....			2					
Gainsboro.....	13			2	15			
Glanford.....	12				10			
Gosfield, South.....	25				25	3		1
Hallowell.....	4				4			6
Houghton.....	4							
Humberstone.....	56				56			1
Keppell.....	1	1						
London.....							1	
Malahide.....	1		3		1		8	25
Malden.....			1					
Marysburgh.....	4			2				
Mersea.....	3			1	3			2
Middleton.....	54				55		1	
Moulton.....	106	2			112	7		3
Nissouri, East.....		1						
Nissouri, West.....			2					
Oneida.....	62	8			66			4
Onondaga.....	36	6		5	36	3		
Orford.....		1						
Rainham.....	295	4	9	19	306	4	4	16
Raleigh.....	39	1	4	12	50	2	3	5
Romney.....	136	5		5	137	4		
Sarnia.....					4			
Seneca.....	170	9			158	6		4
Sherbrooke.....	11				15	1		
Southwold.....			1					
Tilbury East.....	141	8		1			2	2
Townsend.....	2		1		139	10		
Tuscarora.....	78	2		2	78			
Wainfleet.....	31		1	3	29	12		9
Walpole.....	413	6	6	13	422	7	6	13
Walsingham, N.....	13				9			
Walsingham, S.....	13				17			2
Willoughby.....	41		3	3	42		4	6
Windham.....	10				10	1		
Woodhouse.....	65		1	4	69	1	3	
Yarmouth.....			1				1	
Private wells.....	300				300			
Surface wells.....	69				69			
Total.....	3,065	89	53	114	3,122	84	63	142

Table 202.—Capital Employed in the Natural Gas Industry in Canada, by Provinces, 1938 and 1939

	1938			1939		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—						
Cost of lands, buildings, plant, machinery and tools.....	40,440,653	23,829,894	†66,076,199	40,281,295	24,182,126	*66,176,710
Cost of supplies and stock on hand.....	611,290	160,229	† 788,407	544,870	221,013	*781,307
Cash, trading and operating accounts and bills receivable.....	10,002,872	2,067,838	†12,279,224	9,110,297	2,141,126	*11,451,321
Total.....	51,054,815	26,057,961	†79,143,830	49,936,462	26,544,265	*78,409,338

† Includes data for New Brunswick, Manitoba and Saskatchewan.

* Includes data for New Brunswick and Saskatchewan.

Table 203.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1938 and 1939

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1938					\$	\$	\$
New Brunswick.....	13	7	65	85	41,538	78,223	119,761
Ontario.....	527	126	759	1,412	907,025	750,892	1,657,917
Saskatchewan.....	6	.....	18	24	5,340	19,631	24,971
Alberta.....	94	35	316	445	198,126	505,346	703,472
Canada.....	640	168	1,158	1,966	1,152,029	1,354,092	2,506,121
1939							
New Brunswick.....	13	8	59	80	40,079	78,496	118,575
Ontario.....	496	127	791	1,414	942,397	742,868	1,685,265
Saskatchewan.....	3	.....	8	11	3,720	3,508	7,228
Alberta.....	98	44	343	485	216,088	509,064	725,152
Canada.....	610	179	1,201	1,990	1,202,284	1,333,936	2,536,220

* See footnote on page 30.

Table 204.—Casing Used in the Natural Gas Industry in Canada, 1939

Size	Weight	Length	Size	Weight	Length
Inches	Pounds	Feet	Inches	Pounds	Feet
1½.....	3,750	1,250	7.....	40,320	1,680
2.....	15,040	3,000	8.....	48,182	1,914
5.....	24,649	2,900	8½.....	14,180	690
5½.....	6,786	377	10.....	48,540	1,170
5¾.....	118,275	9,909	12.....	2,200	55
6.....	424,073	26,658	13.....	2,180	40
6½.....	47,991	2,823			
6¾.....	3,936	164	Total.....	800,062	52,630

PEAT

Peat production in Canada during 1939 totalled 445 tons valued at \$2,445 as compared with the preceding year's total of 620 tons at \$3,500. The 1939 output was obtained from Ontario bogs.

Table 205.—Production of Peat (for Fuel) in Canada, 1934-1939

Year	Tons	Value	Year	Tons	Value
		\$			\$
1934.....	1,878	7,343	1937.....	478	2,676
1935.....	1,340	5,761	1938.....	620	3,500
1936.....	1,341	7,376	1939.....	445	2,445

THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products

1. Production of Crude Petroleum

The Canadian production of crude petroleum and natural gasoline set up a new high record in 1939 when 7,826,301 barrels worth \$9,846,352 were produced. In 1938, the output totalled 6,966,084 barrels valued at \$9,230,173.

Production from New Brunswick wells in 1939 amounted to 22,799 barrels compared with 19,276 barrels in the preceding year. As usual, the 1939 output was obtained from the Stony Creek field, near Moncton. The small topping plant at Weldon was in operation during the year and produced gasoline and fuel oil from the Stony Creek crude.

Ontario's production rose to 206,379 barrels, averaging \$1.95 per barrel from the 1938 total of 172,641 barrels at \$2.08 per barrel.

Col. R. B. Harkness, Commissioner of Gas for Ontario, summarizes the petroleum situation in that province as follows:—

"The quantity of petroleum produced in Ontario in 1939 has exceeded any year since 1919, when the producer received \$3.40 per barrel for his oil, which price included a bonus of 1½ cents per gallon paid by the Dominion Government, as compared with \$1.98 in 1939. The total for 1939 is 206,379 barrels, which exceeds 1938 by 33,737 barrels. This increase is mainly from the oil field in Warwick, Metcalf, and Adelaide townships, discovered in 1938 and developed in 1938 and 1939. The Dover (Raleigh) field shows a considerable increase over 1938, but it could be more accurately stated by saying that in the year 1938 the production in the Dover field had a severe setback due to operating conditions, which have been remedied to a considerable extent in 1939. The Bothwell field appears to have reached or possibly passed its peak production from the reclaimed area which was first developed in 1860-66. Other fields show slight variations that are not unusual.

"The attempt to revive the old Fletcher (Tilbury East) oil field, begun in 1937, has not been successful. This old field produced oil from 1906 until about 1916, when the major part of it was abandoned. A few of the best wells were pumped at intervals until 1923, when the Dominion Government bonus on crude oil was removed; it was then found that there was no profit in the operation owing to the quantities of salt water to be pumped.

"It might be said that increase is due to the low price, which forced producers to take stock of their operations, eliminate non-profitable wells, and use salvaged casing, tubing, and pumps to equip other producing wells that were profitable. The younger generation of Ontario operators have shown considerable ingenuity in designing and building mobile power-driven units for repairing and "cleaning out" old oil wells. Most of these units have been built around old motor vehicles and they have taken the place of the expensive and cumbersome equipment in use a decade ago. The result has been that maintenance and repairs have been speeded up, and the cost, both overhead and operating, has been reduced.

"The price paid for Ontario crude averaged \$1.98 per barrel in 1939, the lowest in any year since 1933. As 98 per cent of crude oil refined in Ontario is imported, the price paid Ontario producers is dependent on the price paid for imported crude at Ontario refineries, with, of course, adjustments on the basis of specific gravity. The great flood of oil from the new field in the state of Illinois had the effect of depressing the price of oil in the United States with a consequent reflection in the price of Ontario crude. The price of oil at Petrolia from January 1 to November 5 was \$1.90 per barrel, and from November 5 to December 31, \$2.10. Oil Springs crude brings a bonus of 7 cents over these prices. When it is considered that the average production from operating wells in the Petrolia field is about 8 gallons per day, and in Oil Springs, 4 gallons, an income per well per day in Oil Springs of about 21 cents at \$1.90 per barrel, it can easily be seen that the oil producers are operating on a very small margin of profit, and even a small variation in price may mean disaster. It at once becomes evident that these old Ontario oil fields are more than ever a training ground for skillful, ingenious, and efficient operators."

Thirty-nine drilling rigs were in operation in 1939; capital employed by the operators of these rigs was \$133,876. Sixty-six men were employed during the year; salaries and wages paid amounted to \$37,242. Dry holes drilled numbered 85 with a total footage of 45,292; 63 producing wells were drilled to a total depth of 28,275 feet.

A new high level was reached in the production of crude petroleum and natural gasoline in Alberta during 1939; the year's output totalled 7,576,932 barrels compared with 6,751,312 barrels in 1938, the previous record year. Production in the Turner Valley field during 1939 ranged from a low point of 334,877 barrels in February to a peak of 874,064 barrels in July.

Four natural gasoline absorption plants were active in Alberta during 1939. The Royalite Oil Company Limited operated two of these plants; the other two were operated by the Gas & Oil Products Limited and the British American Oil Company. The total natural gasoline output of these plants in 1939 was 299,409 barrels as against 503,612 barrels in the preceding year and 653,887 barrels in 1937.

Drilling operations were in progress on 79 wells in Alberta during 1939 and approximately 343,000 feet were drilled. Thirty-six wells were brought into production during the year and 13 dry wells were drilled. In 1938, drilling activities were reported on 93 wells and the footage drilled was 361,000. Two hundred and seventeen wells were in operation in Alberta at the close of 1939 and drilling was in progress on 30 other wells at the close of the year. Operations in this province resulted in the use of 318,901 feet of casing weighing 5,068 tons; in the previous year, 442,473 feet of casing weighing 7,418 tons were used. The value of the casing used in 1939 was \$602,713 compared with \$1,045,590 in 1938. Capital employed by the 113 firms active in Alberta during the year amounted to \$50,604,821. These firms employed 1,499 salaried employees and wage-earners who received salaries and wages totalling \$2,371,999.

Activities in Alberta during 1939 were reviewed by Mr. J. L. Irwin, Statistician, Alberta Department of Lands and Mines, as follows:

"At the close of 1938 it was stated that the most important event of that year was the bringing into production in December of the Home-Millarville, No. 2 well, the largest producer in the Valley, situated at the extreme north end of the field. A year has gone by and it is still the largest producer.

"By a strange coincidence, with the close of 1939, a somewhat similar event took place in the same area when Royalite No. 43, about $2\frac{1}{2}$ miles south-east of the Home No. 2 well, came in and took its place as Turner Valley's second largest producer.

"The new well was drilled only to the upper producing zone of the limestone. Without going to the lower, its original production test through a 1" choke gave 2,052 barrels a day and was given an allowable of 407 barrels a day which was reduced to 317 in the allowable production schedule issued by the Conservation Board on December 22, 1939.

"Between Home 2 and Royalite 43 the Home 3 and Home 4 wells have been drilling. Home 4, at the time this review is written—the latter part of January, 1940—has completed operations and is undergoing a test. It is too early yet to state its performance but initial investigations have already proved it to be a commercial producer. Home 3, already in the limestone, will be completed shortly and should, without doubt, become a producer as well.

"Turner Valley's productive crude oil zone is at present known to be about 17 miles in length and approximately 1 mile in width. This area, of course, may become larger. The line curves from the southern end to the north-west, following the general trend of the foothills.

"In this zone there are now 97 producing oil wells. About 90 per cent of this number are situated in the south end of the field in an area some five miles in length and one in width. The remaining 10%, with the exception of two wells in the centre of the field, are in the north end, a section which has already produced two of the largest wells in the Valley and which is coming more strongly into the production picture all the time.

"In the half-yearly review published last July it was stated that a test well—the Argus—was drilling in the centre of the 17 mile line, and that another was drilling 3 miles to the south-east—Anglo 8. Both these wells have now been brought in as commercial producers. Halfway between them, a third test in the Arrow well is being drilled. Its present depth is around 6,000'—in the Lower Bentons.

"As formerly stated, the two zones—north from the central Argus well to the richly productive north end, and south from the centre to the present main productive zone—offer an immense area still awaiting development.

"With this development fully carried out, the present confines of the Turner Valley oil area should possess, in numbers of producing oil wells, a total at least double of the present one.

"On the completion of such development and with a market sufficiently widened to absorb the Valley's entire production—on the more generous conservation basis as outlined by Dr. Brown in his evidence given at the McGillivray Commission, a basis which could be carried out without danger to the field—the Turner Valley productive area should then be able to produce in oil volume a quantity equivalent to the 1939 volume of Iraq, which possesses a 1,200 mile pipe-line to the Mediterranean coast.

"If the Valley's productive area becomes extended, the situation will of course be even more improved, and with the addition of at least one more major field, somewhere in the province, Alberta will have become a definite factor amongst the oil producing countries of the world.

"Exploration was continued through the year in other Alberta fields.

"The Vermilion-Lloydminster field, in the centre of the province on the Alberta-Saskatchewan border, is attracting considerable attention. Oil production is secured in this area from 1,400 to 2,000 feet from the surface, the average cost of a well with modern equipment being around \$20,000 or less—about one-eighth of the cost of a Turner Valley well.

"The oil has an average gravity of 15° A.P.I. and has a good base containing a high octane value suitable for aviation gasoline. An analysis of the product from the Wain Town well, now known as Franco-Battleview No. 2, in the Vermilion area, made by James A. Kelso, Director of Industrial Laboratories of the University of Alberta, shows 3·2% gasoline and naptha; 4·8% kerosene distillate; 31% gas oil and fuel oil; 15·6% lubricating distillate and 44·8% residuum, soluble in carbon bisulphide to the extent of 99·5%.

"The Steeveville field in the southern part of the province—about 70 miles west of the Saskatchewan border—is continuing as a centre of activity. Standard Oil of British Columbia, a subsidiary of Standard of California, is now drilling in the extreme south of this area close to the town of Princess. The test in this location of the field is being watched with considerable interest with a view to possible results leading perhaps to new development in this sector. The Anglo-Canadian wells to the north have been capped as gassers.

"Other areas under development during the year were as follows: Brazeau, Clearwater, Grease Creek, Kootenay Dome, Moose Dome, Sheppard Creek, Waite Valley, Whiskey Creek, Pouce Coupe, Wainwright, Cardston, Del Bonita, Spring Coulee and Taber."

Discovery No. 1 and 2 wells in the Northwest Territories, near Fort Norman, were operated during 1939 and produced 20,191 barrels of crude petroleum; a year ago, 22,855 barrels were produced. This oil, which ranged from 38° to 41° Bé, was treated at a small refinery near Fort Norman. The resultant products, gasoline and fuel oil, were used to a considerable extent in connection with mining operations in the Great Bear Lake area.

Table 206.—Production of Crude Petroleum in Canada, by Provinces, 1928-1939

Year	New Brunswick		Ontario		Alberta		Northwest Territories		Canada	
	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$
1928.....	8,043	21,391	134,094	249,737	482,047	1,764,172	.....	.....	624,184	2,035,300
1929.....	7,499	19,909	121,194	253,678	988,675	3,458,177	.....	.....	1,117,368	3,731,764
1930.....	6,758	17,378	117,302	235,746	1,398,160	4,780,696	.....	.....	1,522,220	5,033,820
1931.....	6,577	15,461	122,365	219,993	1,413,631	3,976,220	.....	.....	1,542,573	4,211,674
1932.....	6,408	14,332	130,343	247,468	906,751	2,751,541	910	9,251	1,044,412	3,022,592
1933.....	8,835	18,111	136,058	253,486	995,832	2,844,157	4,608	23,037	1,145,333	3,138,791
1934.....	11,106	22,277	141,385	299,874	1,253,966	3,104,823	4,438	22,188	1,410,895	3,449,162
1935.....	12,954	18,230	165,041	346,156	1,263,510	3,102,227	5,115	25,575	1,446,620	3,492,188
1936.....	17,112	24,075	165,495	350,767	1,312,368	3,019,930	5,399	26,995	1,500,374	3,421,767
1937.....	18,089	25,496	165,205	356,000	2,749,085	4,961,002	11,371	56,855	2,943,750	5,399,353
1938.....	19,276	27,246	172,641	359,268	6,751,312	8,775,094	22,855	68,565	6,966,984	9,230,173
1939.....	22,799	32,082	206,379	401,430	7,576,932	9,362,363	20,191	50,477	7,826,301	9,846,352

Table 207.—Production of Crude Petroleum in Canada, by Months, 1939

(Barrel=35 imperial gallons)

Months	*New Brunswick	Ontario	*Alberta	*Northwest Territories	Canada
	Brl.	Brl.	Brl.	Brl.	Brl.
January.....	73	15,952	515,539	1,602	533,166
February.....	57	16,054	340,107	1,958	358,176
March.....	42	17,521	366,898	812	385,273
April.....	1,275	14,015	543,489	589	559,368
May.....	3,758	19,626	690,066	497	713,947
June.....	2,898	17,818	798,170	2,422	821,308
July.....	2,684	17,175	877,005	2,305	899,169
August.....	2,300	20,545	767,984	5,015	795,544
September.....	1,683	16,161	701,209	1,813	720,666
October.....	1,514	18,596	796,147	.....	816,257
November.....	2,002	17,028	712,179	.....	731,209
December.....	1,815	15,487	485,618	.....	502,920
Total.....	20,101	205,978	7,594,411	17,013	7,837,503

* These figures represent the total output each month.

Table 208.—Production of Crude Petroleum in Canada, 1938 and 1939

Provinces	1938		1939	
	Barrels	Total value	Barrels	Total value
NEW BRUNSWICK.....	19,276	\$ 27,246	22,799	\$ 32,082
ONTARIO—				
Petrolia and Enniskillen.....	58,273	120,229	56,951	109,934
Oil Springs.....	32,283	69,728	32,442	65,715
Moore Township.....	1,398	2,882	1,527	2,947
Sarnia Township.....	595	1,227	397	766
Plympton Township.....	191	394	156	301
Bothwell Township.....	40,449	83,399	39,616	76,364
West Dover.....	8,801	18,145	15,037	29,023
Onondaga.....	878	1,882	219	507
Mosa Township.....	13,527	27,888	12,857	24,816
Brooke.....	101	208	52	101
Dunwich.....	195	402	210	405
Raleigh and Tilbury East.....	207	427	27	52
Thamesville.....	1,990	4,103	1,293	2,496
Dawn and Euphemia.....	5,416	11,166	3,958	7,639
Warwick.....	8,310	17,132	41,478	80,057
Chatham.....	27	56	159	307
Total for Ontario.....	172,641	359,268	206,379	401,430
ALBERTA—				
Turner Valley.....	6,703,548	8,736,664	7,543,929	9,334,069
Red Coulee-Border-Kebo (light crude).....	14,157	12,742	12,649	11,137
Wainwright-Skiff (heavy crude).....	18,229	15,461	20,354	17,157
Taber-Moose Dome.....	15,378	10,227		
Total for Alberta.....	6,751,312	8,775,094	7,576,932	9,362,363
NORTHWEST TERRITORIES.....	22,855	68,565	20,191	50,477
Canada.....	6,966,084	9,230,173	7,826,301	9,846,352

Table 209.—Petroleum Wells in Canada, by Provinces, 1937-1939

	New Brunswick	Ontario	Alberta	Canada
Productive wells at beginning of year.....	1937 23	2,079	129 (a)	2,233
.....	1938 23	2,082	157 (a)	2,264
.....	1939 23	2,110	195 (a)	2,330
Number of productive wells drilled.....	1937 1	38	28	67
.....	1938 1	56	43	100
.....	1939 63	36	.....	99
Number of wells abandoned.....	1937 1	68	.....	69
.....	1938 1	28	2	31
.....	1939 36	7	.....	43
Number of dry wells drilled.....	1937 28	6	.....	34
.....	1938 41	7	.....	48
.....	1939 1	85	13	99
Number of productive wells in operation at end of year.....	1937 23	2,082	157 (a)	2,264
.....	1938 23	2,110	195 (a)	2,330
.....	1939 23	2,065	219 (a)	2,309

(a) Includes 2 wells in the Northwest Territories.

Table 210.—Imports into Canada and Exports of Petroleum, Asphalt and Their Products, 1939

Tariff Item Number	Item	Quantity	Value
(a) IMPORTS			
7151	Oil, imported by miners or mining companies or concerns, for use in the concentration of ores of metals in their own concentrating establishments.....	gal. 48,395	27,416
7153	Crude petroleum not subjected to any other process than natural weathering and removal of foreign matter and water when imported by oil refiners to be refined in their own factories, .8155 specific gravity (42.0° A.P.I.) or heavier at 60° Fahrenheit.....	M gal. 1,292,469	39,411,230
7157	Crude petroleum not subjected to any other process than natural weathering and removal of foreign matter or water, when imported by oil refiners to be refined in their own factory, lighter than .8155 specific gravity (42.0° A.P.I.) at 60° Fahrenheit.....	gal. 5,191,284	213,658
7158	Crude petroleum, n.o.p.....	gal. 658,882	24,890
7156	Fuel oil, ex-warehoused for ships' stores.....	gal. 41,057,202	975,164
7162	Coal oil and kerosene lighter than .8236 specific gravity at 60° temperature, n.o.p.....	gal. 6,518,685	457,224
7163	Engine distillate .8017 specific gravity or heavier at 60° temperature.....	gal. 1,257,808	73,956
7164	Gasoline lighter than .8236 specific gravity at 60° temperature.....	gal. 70,073,942	5,527,116
7165	Natural casinghead, compression or absorption gasoline, lighter than .6690 specific gravity (80.0° A.P.I.) at 60° Fahrenheit, when imported by refiners of crude petroleum for blending, with gasoline wholly produced in Canada.....	gal. 38,947,235	2,471,220
7166	Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon.....	gal. 13,474,618	2,070,674
7167	Lubricating oils, n.o.p.....	gal. 4,592,686	1,886,941
7168	All other oils, n.o.p.....	gal. 293,848	137,718
7169	Products of petroleum, n.o.p., .8236 specific gravity (40.3° A.P.I.) or heavier at 60° Fahrenheit.....	gal. 18,903,258	674,810
7181	Grease, axle.....	lb. 7,719,447	428,080
7182	Vaseline and all similar preparations of petroleum, for toilet, medicinal or other purposes.....	\$	324,506
7183	Paraffin wax.....	lb. 18,038,306	659,765
7184	Paraffin wax candles.....	lb. 213,308	37,091
7185	Products of petroleum, n.o.p., lighter than .8236 specific gravity at 60° temperature.....	gal. 2,900,736	291,614
7186	Liquefied petroleum gases for heating, cooking or illuminating purposes when imported in containers.....	\$	13,206
7141	Asphaltum or asphalt, solid or not.....	cwt. 234,136	198,096
7143	Asphalt oil for paving purposes only.....	gal. 134,221	8,802
	Coke, petroleum.....	ton 147,505	962,537
Total—Petroleum, Asphalt and Their Products.....			\$ 56,875,714
(b) EXPORTS			
	Oil, petroleum, crude.....	gal. 336	17
	Oil, coal and kerosene, refined.....	gal. 614,139	67,267
	Oil, gasoline and naphtha.....	gal. 3,443,416	331,541
	Fuel oil.....	gal. 2,879,286	188,409
	Oil, mineral, n.o.p.....	gal. 709,681	251,176
	Wax, mineral.....	cwt. 3,638	10,148
	Coke, petroleum.....	ton 7,396	190,802
Total—Petroleum and Its Products.....			\$ 1,039,360
(c) RE-EXPORTS			
	Petroleum and its products.....	gal. 28,208	12,145
	Petroleum coke.....	ton 28,208	660,443
Total—Re-Exports.....			\$ 672,588

Table 211.—Capital Employed in the Petroleum Industry in Canada, by Provinces,* 1938 and 1939

	1938			1939		
	Ontario	Alberta	Canada†	Ontario	Alberta	Canada†
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant, machinery and tools.....	954,783	42,504,310	43,531,333	1,170,088	42,769,249	44,028,161
Cost of supplies and stocks on hand.....	11,382	749,726	788,165	18,484	988,114	1,031,312
Cash, trading and operating accounts and bills receivable.....	22,014	7,223,235	7,365,540	63,622	6,847,458	7,042,604
Total.....	988,179	50,477,271	51,685,038	1,252,194	50,604,821	52,102,077

* Data for New Brunswick included in the "Natural Gas Industry."

† Includes data for the Northwest Territories.

Table 212.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces,† 1938 and 1939

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1938					\$	\$	\$
Ontario.....	13	3	238	254	18,990	125,575	144,565
Alberta.....	222	44	1,374	1,640	478,527	2,033,020	2,511,547
Canada.....	235	47	1,612	1,894	497,517	2,158,595	2,656,112
1939							
Ontario.....	18	3	249	270	21,499	145,927	167,426
Alberta.....	221	41	1,248	1,510	510,541	1,890,016	2,400,557
Canada.....	239	44	1,497	1,780	532,040	2,035,943	2,567,983

* See footnote on page 30.

† Data for New Brunswick included in the "Natural Gas Industry."

‡ Data for Northwest Territories included with Alberta.

Table 213.—Casing Used in the Petroleum Industry in Canada, 1939

Size	Weight	Length	Size	Weight	Length
Inches	Pounds	Feet	Inches	Pounds	Feet
1	3,995	3,995	8½	377,280	10,480
2	67,275	7,475	9	136,000	3,400
3	10,506	1,702	10	647,713	14,492
4	507	78	10½	710,018	16,201
4½	1,397	207	12	8,960	160
4¾	8,433	879	13	81,810	1,515
5	63,751	5,986	13½	1,191,258	21,970
5½	106,397	6,169	13¾	543,402	10,063
6	63,070	3,500	16	149,925	1,999
6½	59,714	4,473	18	32,538	374
6¾	1,021,412	36,983	18½	11,622	149
7	5,108,530	190,242	20	21,760	244
8	53,104	1,646	24	14,550	141
8½	32,208	1,342			
Total.....				10,527,135	345,865

Table 214.—World Production of Crude Petroleum, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Countries	1938	1939	Countries	1938	1939
BRITISH EMPIRE			FOREIGN COUNTRIES—Cont.		
United Kingdom (c) (estimated)...	129,000	(a)	Roumania.....	6,499,000	6,141,000
Canada (b).....	881,783	990,671	U.S.S.R.....	28,403,000	29,064,000
Barbados.....	224	(a)	Yugoslavia.....	1,020	1,094
Trinidad (b).....	2,429,754	(a)	Algeria.....	255	(a)
Bahrein Islands (b).....	1,044,000	1,084,000	Egypt.....	222,171	655,894
Brunei.....	695,904	768,519	Morocco (French).....	3,151	(a)
Burma (b).....	1,018,623	(a)	Cuba.....	19,330	14,483
India (b).....	336,225	(a)	Mexico (b).....	5,271,800	6,499,622
Sarawak.....	199,584	170,000	United States (b).....	163,953,200	170,845,000
New Zealand.....	481	426	Argentina (d).....	2,400,718	2,668,000
Australia (Victoria).....	25	(a)	Bolivia.....	19,330	(a)
Total.....	6,740,000		Colombia (b).....	3,162,000	3,104,000
FOREIGN COUNTRIES			Ecuador.....	326,616	330,360
Albania.....	100,000	(a)	Peru.....	2,063,422	1,940,000
Austria.....	62,466	108,168	Venezuela.....	27,628,000	30,050,000
Czecho-Slovakia.....	19,000	18,000	Formosa.....	(a)	(a)
Estonia (shale oil).....	137,426	(a)	Iran.....	10,195,371	10,203,378
France (c).....	78,625	(a)	Iraq.....	4,294,449	(a)
Germany.....	543,355	640,000	Japan (b).....	350,000	370,000
Hungary (c).....	42,122	101,732	Netherlands East Indies.....	7,280,936	7,281,000
Italy (c).....	13,011	11,167	Sakhalin (U.S.S.R.).....	(a)	(a)
Poland.....	499,000	514,600	Saudi Arabia.....	66,000	528,000
			Total.....	264,000,000	
			World's Total.....	271,000,000	

(a) Information not available.

(b) The following conversion rates have been used: 35 gallons = 1 barrel, and the undermentioned barrels = 1 ton:—Canada, 7-9; Trinidad, 7-3; Bahrein Islands, 7-0; Burma, 7-4; India, 7-4; Mexico, 6-6; United States 7-4; Colombia, 7-1; Japan, 7-2.

(c) Including shale oil.

(d) Converted from cubic metres at the rate of 1 cubic metre = .8843 long tons.

2. PETROLEUM PRODUCTS INDUSTRY IN CANADA

Forty-two petroleum refineries operating in Canada during 1939 were distributed by provinces, as follows: 11 in Saskatchewan, 11 in Alberta, 5 in Ontario, 5 in Manitoba, 4 in Quebec, 3 in British Columbia and 1 in each of Nova Scotia, New Brunswick and the Northwest Territories. Operating refineries had a capacity of 200,020 barrels of crude oil per day, distributed as follows—Quebec, 64,500 barrels or 32.2 per cent; Ontario, 44,500 barrels or 22.2 per cent; Nova Scotia, 32,500 barrels or 16.3 per cent; British Columbia, 22,700 barrels or 11.4 per cent; Alberta, 18,250 barrels or 9.1 per cent; Saskatchewan, 14,620 barrels or 7.3 per cent; Manitoba, 2,550 barrels or 1.3 per cent; New Brunswick, 250 barrels or 0.1 per cent and the Northwest Territories, 150 barrels or 0.1 per cent. Eighteen of these plants reported cracking units in use with an aggregate capacity of about 95,500 barrels per day.

During the year 1,307,704,411 gallons of imported crude oil and 262,198,884 gallons of crude oil, naphtha and absorption gasoline from Canadian wells, or a total of 1,569,903,295 gallons were put through Canadian refineries; this was about 61 per cent of the quantity they are equipped to handle. Over 63 per cent or 996,684,536 gallons was imported from the United States, 20 per cent or 311,019,875 gallons came from other countries and nearly 17 per cent came from Canadian wells. The total cost at the refineries of all crude oil and naphtha charged to stills during the year was \$68,046,834. Stocks of crude and naphtha held at refineries on December 31 were reported at 154,546,529 gallons.

Refinery production of gasoline in 1939 amounted to 740,563,619 gallons of which 405,738,237 gallons were made by the straight run process and 334,825,382 gallons by cracking. In addition, the refineries used 34,231,014 gallons of imported casinghead gasoline for blending purposes, but this was not included in the Canadian production figures. The gallonage of gasoline made in 1939 was the greatest on record, being 13 per cent greater than the output in 1938, which in turn was 2 per cent over 1937. The factory selling value of the gasoline made during 1939 was \$64,491,018. Stocks of gasoline held by refineries at the year end included 119,056,751 gallons of straight run and cracked gasoline and 10,556,679 gallons of imported casinghead. In 1939 there was an output of 10,479,315 gallons of natural gasoline from absorption plants in Alberta. Of this amount, only 483,000 gallons were sold direct to consumers while the remainder went to refineries for further treatment. The amount used in refineries is included with the gallonage charged to stills and the refined gasoline made therefrom is included in the refinery output figures.

Imports of gasoline, including casinghead, amounted to 109,021,177 gallons during 1939, which added to a production of 740,563,619, less the increase in refinery stocks of 31,953,163 and less the exports of 3,443,416, made an apparent Canadian consumption for the year of 814,188,217 gallons. Actual sales as reported to the Provincial Governments under the Gasoline Tax Acts amounted to only 807,666,298 gallons.

Production in Canadian refineries of fuel and gas oils (excluding any made and used for cracking purposes) totalled 582,705,683 gallons of which 521,232,546 gallons were made for sale and 61,473,137 gallons for use as fuel in the producing plant. Imports aggregated 59,960,460 gallons and exports amounted to 2,879,286 gallons. Refinery stocks at the end of the year amounted to 75,240,018 gallons or about seven and a half million gallons less than in 1938. The apparent consumption in Canada, as calculated from the above figures, was 647,298,402 gallons.

Output of tractor and engine distillates was 33,620,396 gallons in 1939, imports amounted to 1,257,808 gallons, and refinery stocks declined 3,146,182 gallons. The apparent Canadian consumption was 38,024,386 gallons.

Lubricating oils were produced both in the refineries and in the blending plants, the actual figures being 23,656,313 gallons and 1,360,759 gallons respectively, a total of 25,017,072 gallons. By adding to this total the imports of 18,067,304 gallons and the decline in refinery stocks of 194,687 gallons a consumption in Canada of 43,279,063 gallons is indicated.

Lubricating greases were produced as follows—845,140 pounds in the blending plants and 12,296,476 pounds in the refineries, a total of 13,141,616 pounds. The latter quantity plus the imports of 7,719,447 pounds indicates a consumption in Canada of 20,861,063 pounds during 1939.

Capital employed in the petroleum refining industry in 1939 was reported at \$65,784,933, of which \$35,216,303 was the value placed on lands, buildings and equipment. The average number of employees was 4,675 and payment to these workers in salaries and wages amounted to \$7,736,330. Materials used in refining operations cost \$73,922,206, fuel and electricity cost \$4,573,570 and the products were valued at \$103,494,238.

Table 215.—Materials Used by the Oil Refineries of Canada, 1938 and 1939

	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
		\$		\$
MATERIALS USED—				
<i>Petroleum refining—</i>				
Crude oil (under 60° A.P.I.) in its natural state, from Canadian wells..... Imp. gal.	217,105,125	10,807,043	253,964,242	11,813,685
Crude naphtha (60° A.P.I. and over) in its natural state, from Canadian wells..... Imp. gal.	12,035,820	746,679	5,750,952	338,747
Absorption gasoline, etc., from Canadian wells (run to stills)..... Imp. gal.	7,351,255	496,303	2,483,690	160,059
Crude oil, in its natural state, imported (run to stills)—				
(a) From United States..... Imp. gal.	860,931,586	44,761,798	994,341,531	45,025,216
(b) From other countries..... Imp. gal.	321,229,681	14,067,659	311,019,875	10,577,842
Crude oil, not in its natural state (run to stills)..... Imp. gal.	5,697	570	2,343,005	131,285
Benzol for blending..... Imp. gal.	2,061,032	327,458	2,087,860	328,321
Phenol..... lb.	172,535	26,690	249,472	41,674
Sulphuric acid, 66° Bé..... lb.	19,874,862	194,046	20,377,249	219,201
Sulphur..... lb.	280,060	8,128	175,727	4,161
Caustic soda..... lb.	4,309,264	130,565	4,100,782	127,642
Soda ash..... lb.	424,431	8,915	648,267	13,330
Litharge..... lb.	499,921	36,240	267,923	23,027
Fullers' earth and clay..... lb.	19,687,467	281,668	19,814,473	304,214
Compounding materials..... \$		482,055		507,992
Tetraethyl fluid..... \$		2,677,961		3,023,903
Other materials..... \$		207,325		417,155
Shipping containers..... \$		732,454		864,752
Total..... \$		75,993,557		73,922,206
<i>Lubricating oils and greases—Total..... \$</i>		<i>425,969</i>		<i>543,894</i>
Grand Total..... \$		76,419,516		74,466,000

Table 216.—Products Made by the Oil Refining Industry of Canada, 1938 and 1939

		1938		1939	
		Quantity	Gross selling value at works	Quantity	Gross selling value at works
			\$		\$
PRODUCTS MADE—					
<i>Petroleum refining —</i>					
Made for sale—					
Gasoline—Straight run (1).....	Imp. gal.	362,448,896	32,969,483	405,564,360	35,820,713
By cracking process.....	Imp. gal.	291,422,445	25,664,662	334,806,309	28,651,369
Stove oil (40°-42-5° A.P.I.).....	Imp. gal.	14,429,501	652,935	18,051,831	781,873
Gas and light fuel oil (20°-40° A.P.I., except diesel).....	Imp. gal.	86,884,950	4,157,448	86,120,185	4,061,854
Diesel fuel oil (all fuel oil sold under this name).....	Imp. gal.	50,731,677	2,240,724	54,144,956	2,323,585
Residual fuel oil (10°-20° A.P.I.).....	Imp. gal.	330,308,137	11,447,994	362,915,573	12,140,704
Tractor and engine distillate.....	Imp. gal.	35,002,461	2,873,639	33,618,261	2,607,008
V.M. and P. or solvent naphtha.....	Imp. gal.	7,144,996	583,507	8,218,123	647,534
Kerosene.....	Imp. gal.	22,518,046	2,109,211	27,245,025	2,481,379
Lubricating oil.....	Imp. gal.	21,543,098	4,123,954	23,578,851	4,243,728
Lubricating grease.....	Imp. gal.	13,658,233	669,514	12,287,647	629,082
Asphalt.....	Imp. gal.	54,914,869	3,979,788	56,571,431	4,419,190
Petroleum coke.....	short ton	63,375	388,753	62,094	370,936
Other products.....	\$		219,895		338,189
Total—Made for sale.....	\$		92,081,507		99,517,144
Made for own use—					
Gasoline—Straight run.....	Imp. gal.	134,753	11,743	173,877	16,475
By cracking process.....	Imp. gal.	23,031	3,144	19,073	2,461
Gas and light fuel oil (20°-40° A.P.I.).....	Imp. gal.	1,653,587	61,525	113,677	6,029
Residual fuel oil (10°-20° A.P.I.).....	Imp. gal.	56,822,008	2,102,252	61,317,404	2,026,429
Kerosene.....	Imp. gal.	18,379	1,562	15,230	1,308
Lubricating oil.....	Imp. gal.	74,251	13,701	77,462	13,413
Tar.....	lb.	624,708	27,764	1,536,570	6,829
Asphalt.....	Imp. gal.	65,058	4,879	43,607	3,332
Petroleum coke.....	short ton	634	1,547	4,238	18,253
Still gas.....	M cu. ft.	6,486,618	1,615,350	7,802,666	1,671,238
Other products.....	\$		196,637		211,327
Total—Made for own use.....	\$		4,040,104		3,977,094
Total Petroleum refining.....	\$		96,121,611		103,494,238
Fuel and gas oils made for use in cracking process.....	Imp. gal.	497,513,602		576,923,544	
<i>Lubricating oils and greases—</i>					
Greases, lubricating.....	lb.	602,876	93,021	845,140	155,997
Oils, lubricating.....	gal.	1,091,652	679,188	1,360,759	796,872
Soaps and soap powders.....	\$		80,748		33,117
All other products.....	\$		78,779		98,293
Total lubricating oils and greases.....	\$		881,736		1,084,279

(1) Includes Turner Valley naphtha and natural gasoline run to refinery stills but does not include the imported casing-head gasoline which was used for blending at the refineries.

CHAPTER EIGHT

THE NON-METALLIC MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Asbestos	Miscellaneous	Magnesitic dolomite
Feldspar, Nepheline	Barytes	Magnesium sulphate
Syenite and Quartz	Diatomite	Mineral waters (natural)
Gypsum	Fluorspar	Phosphate
Iron oxides (ochre)	Garnet	Pyrates (sulphur)
Mica	Graphite	Silica brick
Salt	Grindstones, etc.	Sodium carbonate
Talc and soapstone	Lithium minerals	Sodium sulphate
		Strontium minerals

THE ASBESTOS MINING INDUSTRY, AND THE ASBESTOS PRODUCTS INDUSTRY

Production (mine sales) of primary asbestos in Canada during 1939, including all grades, totalled 364,472 short tons valued at \$15,859,212 compared with 289,793 short tons at \$12,890,195 in 1938. The value of sales in 1939 was the highest ever recorded and the tonnage shipped was surpassed only by that in 1937. Production of the mineral in Canada is confined almost entirely to the Eastern Townships of the province of Quebec. In 1939 a relatively few tons were shipped from a deposit located in Northern Ontario.

Canadian asbestos as produced commercially in Quebec is of the chrysotile or serpentine variety and is of high quality. Reserves of milling grade asbestos rock have been reported as sufficient for many years of commercial fibre production. Production of asbestos in Canada from 1880 to 1939, inclusive, totalled 6,930,368 short tons valued at \$255,017,509.

The average value per ton for all grades of mine shipments in 1939 was \$43.51 compared with \$44.48 in 1938; value of crudes in 1939 was \$300.68 per ton against \$328.21 in 1938; fibres, \$62.12 per ton in 1939 compared with \$59.54 in 1938 and shorts, \$17.15 in 1939 against \$17.97 in the preceding year.

The total value of Canadian asbestos exports in 1939 totalled \$15,844,703 compared with \$13,316,558 in 1938. Imports into Canada of various asbestos products in 1939 were appraised at \$1,072,443 against \$911,551 in the preceding year.

The number of Canadian asbestos companies reported as active in 1939 totalled 8; capital employed in the industry amounted to \$22,489,233; employees numbered 3,784 against 3,711 in 1938 and salaries and wages distributed aggregated \$4,347,064 compared with \$4,024,363 in 1938.

Complete and finally revised data on world asbestos production in 1939 are not yet available. In 1936 world production totalled 503,000 long tons of which the British Empire contributed 353,000 long tons; in 1938 production within the Empire totalled 344,000 long tons. The principal asbestos producing countries in the order of their output are Canada, Russia, Southern Rhodesia and the Union of South Africa.

The Bureau of Mines of Quebec reviews the asbestos industry in 1939 as follows: "Asbestos is one of the major mineral products of the Province. In terms of value it ranks second in our list of mineral production, coming immediately after gold. In 1939, the shipments of asbestos fibre amounted to 364,454 tons valued at \$15,858,492. In point of value it is a new record, exceeding the value of the 1920 production which was \$14,749,048, the previous high level of all time, when the asbestos prices were abnormally high.

"Asbestos Corporation, Limited, operated its four principal mines, the King, the Beaver, both in the Thetford area, the British Canadian mine in Black Lake and the Vimy Ridge in Coleraine. The other properties of this Company remained inactive all year.

"Johnson's Company, worked actively its two mines. The main producing mine of this Company is at Thetford Mines, near the King and the Bell mines. The second is at Black Lake, where operations were carried on day and night during the whole year.

"Bell Asbestos Mine.—At present the main supply of asbestos rock is still obtained from the open pit workings but the development work for changing to underground operations is far advanced and some of the rock comes from the underground workings. A new hoisting shaft has been sunk to a depth of 500 feet. Started in April, 1939, it was completed early in January 1940. The shaft head-frame of steel, is 135 feet high, and the outside dimensions of the shaft are 12½ by 12½ feet.

"Canadian Johns-Manville Company, Limited, operated its mine and mill continuously throughout the year, although the mill slowed down somewhat during the first months, the week's work varying from 4 to 6 days. The Cottrell plant which was set up to abate the dust was started in February and the conditions are greatly improved thereby.

"Quebec Asbestos Corporation, at East Broughton operated all year, with the exception of one month in the spring, when the storage sheds were filled to capacity.

"Apart from the above producing companies, a certain amount of exploration work was done on asbestos prospects in the townships of Tingwick, Cranbourne, Thetford, Talon and Broughton."

Table 216(a).—Sales and Shipments* of Canadian Asbestos, 1938 and 1939

	1938		1939	
	Tons	\$	Tons	\$
Crudes.....	2,911	955,423	3,121	938,718
Fibres.....	163,097	9,710,899	(b) 193,992	12,049,539
Shorts.....	123,785	2,223,873	167,359	2,870,955
Total.....	289,793	12,890,195	364,472	15,859,212
Sand, gravel, and stone (waste rock only) (a).....	3,279	2,464	3,897	2,930

(*) All from the province of Quebec unless otherwise noted.

(a) This production is included under the sand and gravel industry.

(b) Includes 18 tons valued at \$720 produced in Ontario.

Table 217.—Asbestos Rock Mined and Milled, 1938-1939

	1938	1939
	Tons	Tons
Quantity of rock mined.....	5,816,368	6,650,416
Quantity of rock milled.....	4,874,548	5,548,765

Table 218.—Sales and Shipments of Asbestos, 1930-1939

Year	Tons	\$	Year	Tons	\$
1930.....	242,114	8,390,163	1935.....	210,467	7,054,614
1931.....	164,296	4,812,886	1936.....	301,287	9,958,133
1932.....	122,977	3,039,721	1937.....	410,026	14,505,791
1933.....	158,367	5,211,177	1938.....	287,793	12,890,195
1934.....	155,980	4,936,326	1939.....	364,472	15,859,212

Asbestos is marketed by the producer in the crude condition (long-fibred material only); in a partly opened state; and in a condition ready for use, i.e., completely fluffed out and freed as much as possible from impurities. The world's largest market is in the United States, and Canada's proximity to this market confers very real advantages on the asbestos industry in this country.

Prices throughout 1939 remained the same as in 1938, and were as follows:—No. 1 crude \$700 to \$750 per ton; No. 2 crude \$150 to \$350; spinning fibre \$110 to \$200; shingle fibre \$57 to \$78; paper fibre \$40 to \$45; cement stock \$21 to \$25; floats \$18 to \$20; shorts \$12 to \$16.50 per ton.

Table 219.—Consumption of Asbestos in Specified Canadian Industries, 1937, 1938 and 1939

Industry	1937		1938		1939	
	Quantity	Cost at works	Quantity	Cost at works	Quantity	Cost at works
		\$		\$		\$
Electrical Apparatus and Supplies—						
Board..... lb.	232,034	34,226	178,401	32,477	179,631	30,521
Yarn..... lb.	119,140	37,325	71,851	27,424	120,394	46,474
Tape..... lb.		16,730	14,945	13,602	21,350	11,194
Boilers, Tanks and Platework..... \$		3,914		7,309		6,556
Asbestos Products—						
Fibre.....						
Other forms.....						
Roofing paper..... ton	2,430	168,334	1,743	73,140	3,740	145,792
Cotton goods, n.e.s..... lb.	10,252	539	20,171	1,050	1,064	592
Woolen goods, n.e.s..... lb.	165,027	49,505	127,321	35,649	149,732	40,051

See Table 224—Asbestos Products Industry

Table 220.—Imports into Canada and Exports of Asbestos, 1938 and 1939

	1938		1939	
	Tons	\$	Tons	\$
IMPORTS—				
Asbestos clutch facings for automobiles, motor vehicles and chassis.....		†93,470		
Asbestos brake linings for automobiles, motor vehicles and chassis.....		*150,410		185,673
Asbestos brake linings and clutch facings, n.o.p.....		*13,157		19,855
Asbestos in any other form than crude, and all manufactures of, n.o.p.....		581,989		764,946
Asbestos packing.....	47	45,866	65	65,074
Asbestos clutch facings.....		*26,659		36,895
Total.....		911,551		1,072,443
EXPORTS—				
Asbestos.....	165,744	10,872,435	186,238	12,463,177
Asbestos sand and waste.....	123,143	2,237,751	159,780	2,902,111
Asbestos manufactures, including asbestos roofing.....		206,372		479,415
Total.....		13,316,558		15,844,703

† To March 31, 1938.

* From April 1, 1938.

Table 221.—Capital Employed in the Asbestos Industry in Canada, 1939

	\$
Capital employed as represented by:—	
Present cash value of the land (excluding minerals).....	8,238,768
Present value of buildings, fixtures, machinery, tools and other equipment.....	7,271,636
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	818,075
Inventory value of finished products on hand.....	1,024,358
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	5,135,796
Total.....	22,489,233

Table 222.—Principal Statistics of the Asbestos Mining Industry in Canada, 1938 and 1939

	1938	1939
Number of firms.....	8	8
Capital employed.....	\$ 22,008,771	22,489,233
Number of employees—On salaries (c).....	313	299
On wages.....	3,398	3,485
Total	3,711	3,784
Salaries and wages—Salaries.....	\$ 584,792	608,529
Wages.....	\$ 3,439,571	3,738,535
Total	\$ 4,024,363	\$ 4,347,064
Selling value of products (a).....	\$ 12,892,659	15,862,142
Cost of fuel and electricity (purchased).....	\$ 1,298,089	1,376,568
Cost of process supplies (b).....	\$ 1,889,636	2,086,945
Net value of sales.....	\$ 9,704,934	12,398,629

(a) Includes value of sand and gravel. (b) Explosives, drill steel, etc. (c) In 1938 and 1939 includes 41 females.

Table 223.—Wage-earners Employed, by Months, in the Asbestos Mining Industry in Canada, 1938-1939

Month	1938	1939		
	Total	Mine		Mill
		Surface	Underground	
January.....	3,337	1,278	380	1,463
February.....	3,402	1,306	388	1,533
March.....	3,331	1,172	413	1,496
April.....	3,349	1,300	387	1,525
May.....	3,429	1,409	393	1,470
June.....	3,410	1,507	407	1,630
July.....	3,262	1,486	442	1,703
August.....	3,394	1,469	460	1,768
September.....	3,398	1,505	505	1,727
October.....	3,505	1,505	531	1,678
November.....	3,535	1,569	549	1,708
December.....	3,412	1,529	523	1,685

THE ASBESTOS PRODUCTS INDUSTRY

Fourteen factories in Canada were occupied chiefly in the manufacture of asbestos goods in 1939. Production by these works was valued at \$1,783,993, this output being 17 per cent above the 1938 total of \$1,531,118, but 6 per cent below the corresponding figure for 1937. Products included brake linings valued at \$639,884, boiler and pipe covering at \$156,878, clutch facings at \$147,249, asbestos packings at \$112,649, and such other lines as asbestos gaskets, paper, cloth, blackboards, yarn, dryer felts, cements, etc.

The factories which operated in this industry in 1939 were distributed as follows: in Quebec, 7; in Ontario, 6; and in Nova Scotia, 1. Fixed and working capital as represented by these works totalled \$2,003,516; the number of employees averaged 415 for each month of the year, and total payments in salaries and wages amounted to \$497,324. Expenditures for fuel and electricity totalled \$99,711 and materials for manufacturing cost \$724,424.

Table 224.—Materials Used in the Asbestos Products Industry, 1938 and 1939

Material	Unit of measure	1938		1939	
		Quantity	Cost at works	Quantity	Cost at works
Asbestos fibre.....	lb.	5,841,692	\$ 110,077	6,895,578	\$ 144,864
Asbestos cloth.....	lb.	64,027	23,529	102,851	35,848
Asbestos paper, corrugated and plain.....	lb.	146,626	6,734	232,992	10,576
Asbestos sheets and strips.....	lb.	21,529	8,728	19,509	8,769
Asbestos yarn.....	lb.	230,777	66,859	427,445	121,227
Cotton cloth and cotton yarn.....	\$		43,578		56,607
Rubber and rubber sheets.....	lb.	89,278	14,943	109,174	21,463
Containers and packing material.....	\$		63,514		32,721
All other materials.....	\$		276,245		292,349
Total	\$		614,207		724,424

Table 225.—Products Manufactured in the Asbestos Products Industry, 1938 and 1939

Product	Unit of measure	1938		1939	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos brake linings—Moulded.....	ft.	1,859,377	330,726	2,245,559	489,305
Other.....	ft.	1,197,453	148,108	1,096,577	150,579
Asbestos boiler and pipe covering.....	ft.	1,619,599	145,621	1,769,485	156,878
Asbestos clutch facings.....	no.	529,766	117,082	638,498	147,249
Asbestos gaskets.....	lb.	33,733	21,900	38,185	19,669
Asbestos packings of all kinds.....	lb.	253,475	93,689	283,358	112,649
All other products (*).....	\$		673,992		707,664
Total.....	\$		1,531,118		1,783,993

(*) Includes products reported by 1 or 2 firms, such as, asbestos dryer felt, hydraulic brake hose, asbestos shingles, asbestos yarn, packings of rubber, duck or flax, asbestos paper, asbestos cloth, etc.

Table 226.—World Production of Asbestos, 1937-1939

(Supplied by *Imperial Institute*)

(Long tons)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
Southern Rhodesia.....	50,905	52,509	52,065	Czecho-Slovakia.....	(a)	(a)	.....
Uganda.....		52		Finland.....	7,500	6,321	.....
Union of South Africa—				France.....	200	450	.....
Amosite.....	5,808	7,850	10,088	Greece.....	2	84	.....
Blue.....	4,686	7,841	9,042	Italy.....	6,292	6,752	.....
Chrysotile.....	15,049	4,977	476	U.S.S.R.....	120,000	5,000	.....
Anthophyllite.....	22		11	United States (sales)—			
Canada—				Chrysotile.....	11,861	11,519	13,113
Chrysotile (b).....	369,648	261,671	328,901	Amphibole.....	546		402
Crude.....	3,434	2,568	2,787	Bolivia.....	21	21	.....
Fibre.....	178,792	145,622	173,807	Venezuela.....	(a)	(a)	.....
Shorts.....	183,869	110,522	149,428	French Indo-China.....			.....
Sand and gravel (waste rock only).....	3,553	2,928	3,479	Japan (estimated).....	1,000	1,000	1,000
Cyprus.....	11,173	9,532	9,836	Korea.....	69	(a)	87
India.....	100	89		Turkey.....	155	657	108
Australia.....	298	173		Argentina.....			.....
Swaziland.....			4,099	Total.....	150,000	116,000	15,000
Total.....	458,000	344,000	743,000	World's Total.....	610,000	460,000	758,000

Asbestos is also produced in China.

(a) Information not available. (b) Sales and shipments.

FELDSPAR AND QUARTZ MINING INDUSTRY

Owing to the very close physical association of these minerals in many Canadian deposits (pegmatites), it has been found difficult for some operators to make a separation of all data pertaining to the mining of each individual mineral and, for this reason, the general statistics relating to capital, employment, fuel and electricity, etc., have been combined in this Chapter. Since 1936 corresponding statistics relating to the production of nepheline-syenite have been included with those pertaining to the commercial production of feldspar and quartz.

During 1939 the gross value of production by the industry and including the value of feldspar, quartz and nepheline-syenite sold totalled \$1,352,671 compared with corresponding values of \$1,233,647 in 1938 and \$1,428,714 in 1937. In 1939 commercial shipments of feldspar were made only from properties located in Ontario, Manitoba and Quebec; quartz in various forms was produced in Nova Scotia, Quebec, Ontario and Saskatchewan while production of nepheline-syenite was confined to the province of Ontario.

The number of firms reported as active in the industry in 1939 totalled 43, capital employed was recorded at \$1,591,015, employees numbered 338, salaries and wages paid amounted to \$330,170 and the value of fuel, electricity and process supplies consumed totalled \$178,721. The net value of all products sold was estimated at \$1,173,950 compared with \$1,065,138 in 1938.

FELDSPAR

Production of feldspar in Canada during 1939 totalled 12,500 short tons valued at \$112,309 compared with 14,058 short tons at \$129,293 in 1938. Of the 1939 output 5,399 tons valued at \$60,923 were mined in the Province of Quebec, 7,061 tons at \$51,056 in Ontario and 40 tons worth \$330 in Manitoba.

According to the Bureau of Mines, Ottawa, nepheline-syenite used as a substitute for straight feldspar in the glass trade, on account of its higher content of alumina, is doubtless responsible for the decreased sales of Canadian feldspar. This is a condition that may be expected to continue because, in the United States, to which much of the Canadian product is shipped, one-half of the feldspar now used is consumed in glass manufacture. Canadian spar, however, enjoys a high reputation as a standard grade for various ceramic purposes, and a moderate demand is likely to be maintained for both domestic use and for export.

The output of crude feldspar in the United States rose sharply in 1939, exceeding in quantity any year except 1937 but the value was less than that in several earlier years, according to the Bureau of Mines, United States Department of the Interior. However, there was in 1939 a substantial production of feldspathic material known as "aplite", in Virginia, which might have been included in the totals were it possible to do so without revealing confidential information. Even excluding this material, which virtually made its commercial debut in 1939, the average value of the output (\$4.39) was less than in 1938, continuing a steady downtrend since 1936, when the average sales realization reported by producers was \$5.32 a long ton.

Sales of ground feldspar in the United States increased sharply compared with 1938, the tonnage rising 20.8 per cent and the value 16.1 per cent. However, compared with 1937, the all-time record year, they were 7.2 per cent less in quantity and 17.9 per cent less in value. Of the total of 259,194 short tons sold by merchant mills in 1939, 53 per cent, or 138,336 tons were shipped to the glass industry; about 34 per cent (87,209 tons) consumed in pottery manufacture; 11 per cent (28,356 tons) used by the enamel trades; and the remainder entered miscellaneous uses, chiefly ceramic. Grinding mills processing 99 per cent of the total feldspar ground in the United States reported distribution of shipments by States in 1939. Chief consuming States in order of tonnage were: Ohio, Indiana, Pennsylvania, New Jersey, West Virginia, Illinois and New York.

Table 227.—Production of Feldspar in Canada, by Provinces, 1930-1939

	Quebec		Ontario		Manitoba		Average value per ton
	Tons	\$	Tons	\$	Tons	\$	
1930.....	17,074	163,802	9,722	104,667	.....	.....	\$ 10.02
1931.....	10,381	86,842	7,962	100,119	.....	.....	10.19
1932.....	3,390	39,062	3,657	42,920	.....	.....	11.63
1933.....	6,183	59,283	4,387	45,350	.....	88	9.86
1934.....	9,207	78,853	7,302	61,665	1,793	6,763	8.05
1935.....	7,002	63,075	8,656	75,093	2,084	6,252	8.13
1936.....	8,115	75,703	8,409	70,840	1,322	7,932	8.66
1937.....	12,285	105,612	9,061	72,610	.....	.....	8.35
1938.....	5,874	62,878	8,106	65,964	78	451	9.22
1939.....	5,399	60,923	7,061	51,056	40	330	8.98

Values shown in Table 227 include the values of both crude and milled products.

Table 228.—Imports and Exports of Feldspar, 1934-1939

	Imports*		Exports	
	Tons	\$	Tons	\$
1934.....	1,039	15,245	10,532	65,158
1935.....	608	11,000	9,959	59,893
1936.....	741	14,240	14,133	94,537
1937.....	1,794	25,134	17,462	197,000
1938.....	657	10,450	14,998	34,244
1939.....	.....	.....	(a) 6,455	44,531
1939.....	865	11,681	7,661	49,957

* Includes both feldspar and nepheline syenite 1936 to March 31, 1938.

(a) Feldspar only from April 1, 1938. In addition from April 1, 1938 there were exported 22,787 tons of nepheline syenite valued at \$94,877 (all to U.S.A.).

* Crude and ground.

Table 229.—Feldspar Consumed in Specified Canadian Industries, 1938 and 1939

Industries	1938		1939	
	Tons	\$	Tons	\$
Abrasive products.....	41	1,129	45	1,368
Imported clay products.....	1,890	35,979	2,021	38,840
Soaps and cleaning preparations.....	1,008	11,212	1,146	12,413
Iron and steel products.....	390	5,215	468	8,242
Glass.....	1,343	20,788	609	9,727
Enamelling materials.....	290	4,350	350	5,250

Feldspar Prices (October, 1939)—UNITED STATES—Per ton, f.o.b. North Carolina, potash feldspar, 200 mesh, white, \$17 in bulk; soda feldspar, \$19. F.O.B. Maine, potash feldspar, white, 200 mesh, \$17, in bulk. Granular glass spar, white, 20 mesh, F.O.B. North Carolina, \$12.50 in bulk; semi-granular, \$11.75; soda feldspar, 200 mesh, white, \$19. Virginia: No. 1, 230 mesh \$18; 200 mesh, \$17; No. 17 glassmakers', \$11.75; No. 18, \$12.50. Enamelers, \$14 to \$16. Quotations on Spruce Pine, N.C., or Keene, N.H., basis. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

"Canadian Chemistry and Process Industries", Toronto, published feldspar quotations September, 1939, as follows:—Feldspar, pottery, ground, 200 mesh, F.O.B. mill, carlots, ton—\$17; feldspar rock, F.O.B. mill, carlots, ton, \$5 to \$7.

Table 230.—World Production of Feldspar, 1937-1939

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Germany (Bavaria only)...	9,828	(a)	
China stone.....	60,715	48,383		Italy.....	13,225	13,180	
Canada (sales).....	19,059	12,552	11,161	Norway.....	23,859	(a)	
India.....	487	691		Roumania.....	2,546	3,288	
Australia (including china stone).....	3,806	2,370		Sweden.....	48,364	44,399	
FOREIGN COUNTRIES				Egypt.....	156	196	73
Czecho-Slovakia (estimated).....	30,000	25,000		United States (sales).....	268,532	196,119	253,466
Finland (exports).....	3,181	4,966	5,508	Argentina.....	1,325	610	1,034
				Brazil.....	8,300	(a)	
				Manchuria.....	(a)	(a)	

Feldspar is also produced in U.S.S.R. and China.

(a) Information not available.

NEPHELINE-SYENITE

Production of nepheline-syenite in Canada during 1939 was valued at \$140,148 compared with \$142,737 in the preceding year. The output in both years came from properties located in eastern Ontario.

The following information relating to nepheline-syenite is abstracted from report No. 791 issued by the Bureau of Mines, Ottawa:—"Nepheline-syenite is an igneous rock consisting of a mixture of the feldspathoid mineral nepheline (or nephelite), a silicate of alumina and soda, and varying amounts of soda and potash feldspars. It is used in the ceramic trade (at present mainly in the glass industry) as a substitute for straight feldspar. .

"Interest in the material as an industrial mineral or rock is of recent date, the first production being in 1936, when Canadian Nepheline Ltd., opened a quarry at Blue Mountain in Methuen township, Peterborough county, about 27 miles northeast of Lakefield, and erected a mill at Lakefield to crush and process the rock for market."

During 1939 the mineral was shipped by the Canadian Flint and Spar Co. Ltd. from the Bentley mine, Dungannon township, Hastings county; by Canadian Nepheline Ltd., from Methuen township, Peterborough county; by the Temagami Development Company Ltd., from the Morrison property, Dungannon township and by the New England Nepheline Co. Inc., from the Bancroft mine, Bancroft, Ontario.

The potential nepheline-syenite reserves of the Central Ontario region are undoubtedly very large, the Blue Mountain occurrence alone being a massive body about eight miles long and consisting in a large part of such rock. Numerous small outcrops are known in the Bancroft and adjacent areas to the north.

Table 231.—Production of Nepheline-Syenite in Canada,† 1936-1939

Year	Quantities	Value
		\$
1936.....	(a)	(b) 37,426
1937.....	(a)	121,481
1938.....	(a)	142,737
1939.....	(a)	140,143

† Produced in Ontario only.

(a) Quantity not published.

(b) First commercial production in Canada.

Nepheline-syenite used in Canada during 1938 in the manufacture of glass totalled 2,538 tons valued at \$41,678; in 1939 the consumption by this industry was 3,472 tons worth \$58,629.

QUARTZ (SILICA)

The production of natural silica or quartz in Canada during 1939 totalled 1,582,935 short tons valued at \$1,100,214 compared with 1,380,011 tons at \$961,617 in 1938. Output of primary silica products by the Canadian Quartz Mining industry includes crude and crushed dyke quartz, quartzite, sandstone and natural silica sands and gravels. The mineral in one or more of the forms thus defined was produced during 1939 in Nova Scotia, Quebec, Ontario and Saskatchewan. Shipments of silica in Nova Scotia were made to steel plants largely for the making of silica brick. In Quebec high grade silica sands were produced for the manufacture of glass and chemicals while a considerable tonnage of these same sands was sold for sand-blasting and various other purposes; in the same province relatively large quantities of crushed quartzite or sandstone were mined and milled for the manufacture of silicon carbide and other products. The greater part of the tonnage of silica shipped in Ontario during 1939 represented material intended for use in the production of silica brick and ferro-silicon and for the fluxing of nickel-copper ores. Quartz production as recorded for Saskatchewan represented low-grade natural silica sands or gravels shipped as flux to the Flin Flon Smelter of the Hudson Bay Mining and Smelting Co. Ltd.

The price per ton of the several grades of silica varies greatly depending on its purity and on the purpose for which it is to be used. Silica, on the whole, is a comparatively low-priced commodity, and therefore the location of a deposit with respect to markets is of great importance. According to a report issued by the Bureau of Mines, Ottawa, the larger markets for silica are in the provinces of Quebec and Ontario, and any new deposits being opened up should be within economic reach of either Montreal or Toronto.

Imports into Canada during 1939 of silix or crystallized quartz, ground or unground totalled 2,751 short tons valued at \$61,497; imports of silica sand for glass, carborundum and steel and filtration plants, etc., in the same year, amounted to 167,721 short tons worth \$349,256.

Table 232.—Production in Canada and Imports of Quartz and Silica Products, 1938 and 1939

	1938		1939	
	Short tons	Value	Short tons	Value
		\$		\$
PRODUCTION* (SHIPMENTS)—				
Nova Scotia.....	4,701	8,415	10,574	18,927
Quebec.....	85,153	315,251	104,827	369,172
Ontario.....	1,173,259	597,037	1,333,342	665,148
Manitoba.....				
Saskatchewan.....	116,898	40,914	134,192	46,967
British Columbia.....				
Canada.....	1,380,011	961,617	1,582,935	1,100,214
IMPORTS—				
Ganister.....	360	2,888	255	2,018
Flint and ground flint stones.....	1,005	16,946	645	11,601
Silex or crystallized quartz, ground or unground.....	3,069	77,815	2,750	61,497
Silica sand for glass, carborundum and steel and filtration plants and sand blasting (a).....	172,073	338,832	167,721	349,256
Silica firebrick, 90 per cent silica.....		240,184		312,413

* Includes both crude and crushed quartz and quartzite, silica flux and natural silica sands.

(a) 164,601 tons from the United States and 7,427 tons from Belgium in 1938 and 164,232 tons from the United States, 3,388 tons from Belgium and 101 tons from the United Kingdom in 1939.

† Entirely from the United States in 1938 and \$294,228 from the United States and \$18,185 from the United Kingdom in 1939.

Table 233.—Production* (Use) of Natural Low Grade Silica Sand and Silica Gravel As Non-ferrous Smelter Flux, 1937, 1938 and 1939

	1937		1938		1939	
	Tons	\$	Tons	\$	Tons	\$
Ontario.....	980,427	343,149	990,020	349,657	1,195,558	418,445
Saskatchewan.....	95,809	33,533	116,898	40,914	134,192	46,967
Canada—Total.....	1,076,236	376,682	1,106,918	390,571	1,329,750	465,412

(*) Includes in totals shown in Tables 232 and 234; also complete data for production of this material in Ontario during previous years are not available.

Table 234.—Production of Quartz (Silica) in Canada, 1930-1939

Year	Ton	\$	Year	Ton	\$
1930.....	226,200	418,127	1935.....	233,002	424,832
1931.....	195,724	303,158	1936*.....	1,046,649	597,718
1932.....	189,132	276,147	1937*.....	1,377,448	1,129,011
1933.....	185,783	297,820	1938*.....	1,380,011	961,671
1934.....	272,563	482,265	1939*.....	1,582,935	1,100,214

* See footnote preceding table.

In 1916 it was stated that, included with the annual statistics of quartz was a small production of grinding pebbles obtained from near Jackfish, Ontario, on the north shore of Lake Superior, by the Canada Pebble Co., Ltd. These pebbles were used chiefly in the cement industry. It was also reported that considerable deposits of rounded quartzite pebbles, suitable for grinding purposes, were found on the Cypress Hills, south of Maple Creek, Southern Saskatchewan. During 1930 the production of grinding pebbles from the Jackfish deposits amounted to 560 tons; in 1925 the total was 105 tons and in 1926 only 64 tons. The Hedley Gold Mining Co. used pebbles obtained from Hedley, Similkameen district, British Columbia, in 1922. No production of grinding pebbles has been reported in Canada during recent years.

Prices—UNITED STATES (May, 1940).—Silica, per ton, water ground and floated, in bags, f.o.b. Illinois: 325 mesh, \$21 to \$40 for 92 to 99½ per cent grades. Dry ground, air floated, 325 mesh, 92 to 99½ per cent silica, \$20 to \$30. Glass sand, f.o.b. producing plant, \$1.25 to \$5 per ton; molding sand, 50 cents to \$3.50; blast sand, \$1.75 to \$6. California: \$5 for quartz and \$2.50 for sand. Quartz rock crystals, for fusing, all sizes, \$100 (†) per ton; prisms for piezo-electrical and optical use command premium. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

"Canadian Chemistry and Process Industries"—Toronto—quotations (September, 1939)—Silica sand, various grades, carlots, ton \$3 to \$9. Silica quartz 99 per cent, 110-220 grade, carlots—to \$15 per ton. The price for the lower grades of crude quartz varies greatly according to purity and purpose of use.

Table 235.—Consumption of Quartz, Silica Sand, Etc., in Canada, by Industries, According to Census of Industry Reports, 1938 and 1939

Industry	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
SILICA SAND AND SILICA (including ground quartz)—				
Soaps and cleaning preparations.....	4,987	80,056	5,654	86,596
Acids and salts.....	12,874	52,592	16,265	76,229
Paints.....	838	23,986	748	21,511
Refractories.....	6	60	440	2,640
Roofing paper.....	1,050	5,132	1,420	7,877
Abrasives.....	32,746	159,284	32,661	161,514
Glass.....	77,499	363,233	74,511	351,671
Enameling materials.....	380	5,700	390	5,850
Products from imported clays.....	2,576	38,441	1,968	27,161
Foundry facings and supplies.....	32	243	102	714
Non-ferrous smelters†.....	1,106,918	390,571	1,329,750	465,412
Steel industries.....	11,969	79,245	28,360	183,756
Ferro-alloys.....	23,711	47,539	34,654	77,863
Total accounted for.....	1,275,586	1,246,082	1,526,923	1,468,794

NOTE.—Consumption values are costs at works.

† The quantities reported under this industry represent low grade natural silicious sands used for fluxing purposes. In addition to the quantities shown a relatively large quantity of quartz and quartzite is consumed in the manufacture of silica brick.

Table 236.—Principal Statistics of the Feldspar and Quartz Mining Industry, 1938 and 1939

	ONTARIO (x) (b)		QUEBEC	
	1938	1939	1938	1939
Number of firms (a).....	15	17	17	26
Capital employed..... \$	585,102	598,255	1,020,034	992,760
Number of employees—On salary.....	25	15	24	20
On wages.....	142	169	184	134
Total.....	167	184	208	154
Salaries and wages—Salaries..... \$	30,133	19,915	35,675	30,995
Wages..... \$	140,959	165,721	135,481	113,539
Total..... \$	171,092	185,636	171,156	144,534
Selling value of products (gross)..... \$	855,518	922,576	378,129	430,095
Cost of fuel and purchased electricity..... \$	30,360	35,525	45,290	43,589
Cost of process supplies..... \$	68,774	74,217	24,085	25,390
Net value of sales..... \$	756,384	812,834	308,754	361,116

(x) In 1938 includes 1 firm operating in Nova Scotia, Manitoba and Saskatchewan (a total of 3). In 1939 includes 1 firm in Nova Scotia, 2 in Manitoba and 1 in Saskatchewan.

(a) Small shippers from whom reports were unobtainable and whose production is recorded from consumers returns are sometimes not included in the total.

(b) Includes data relating to production of nepheline-syenite.

Table 237.—Capital Employed in the Feldspar and Quartz Mining Industry, in Canada, 1939

	Quebec†	Ontario
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Present cash value of the land (excluding minerals).....	174,075	88,831
Present value of buildings, fixtures, machinery, tools and other equipment.....	713,686	336,605
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	37,131	39,714
Inventory value of finished products on hand.....	22,999	91,625
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	49,969	36,380
Total.....	997,860	593,155

† Includes 1 firm in Nova Scotia and 2 in Manitoba.

Table 238.—Number of Wage-earners on Pay Roll, by Months, 1938-1939

Month	1938	1939		
		Quebec	Ontario	Canada*
January.....	279	113	96	209
February.....	292	105	106	211
March.....	280	114	107	221
April.....	271	116	94	210
May.....	362	130	170	314
June.....	382	144	171	331
July.....	413	153	196	367
August.....	429	178	197	397
September.....	368	164	188	374
October.....	318	175	205	402
November.....	299	149	190	356
December.....	222	145	150	313

* Includes a few employees in some months in Nova Scotia and Manitoba.

THE GYPSUM INDUSTRY

(1) Primary Production—The Gypsum Mining and Quarrying Industry

Production (producers' sales and consumption) of gypsum in Canada during 1939 totalled 1,421,934 short tons valued at \$1,935,127 compared with 1,008,799 short tons at \$1,502,265 in 1938. The tonnage in both years represents various grades of crude gypsum and anhydrite shipped from quarries or mines together with the tonnage of calcined gypsum used in or shipped from quarry or "primary" plants. The quantity of the mineral produced in 1939 established an all-time high record in the history of the Canadian gypsum mining industry; the value, however, was exceeded annually during the years 1922-1931 inclusive.

The quantity of crude gypsum mined in 1939 amounted to 1,488,778 short tons while the tonnage of anhydrite mined totalled 43,645 short tons. Crude gypsum calcined in primary quarry plants totalled 138,163 short tons.

The following are the average prices per short ton recorded for total sales of various grades, including anhydrite, by the industry in 1939: Crude lump, \$1.21; crushed crude, \$1.01; ground crude, \$6.04; calcined (quarry), \$12.55.

In 1939 the number of firms reporting production was 10 and the gypsum quarries and mines in operation totalled 17. Some of the Canadian gypsum mining companies confine their operations in the Dominion to the production and shipment of crude gypsum or anhydrite, while others, in addition to marketing various grades of crude gypsum, produce a calcine for sale or for consumption in their own gypsum products plants.

Capital employed by Canadian gypsum mining companies totalled \$6,806,907 in 1939; employees aggregated 714; salaries and wages paid amounted to \$692,158 and the total value of fuel, purchased electricity and process supplies used was recorded at \$299,319.

Gypsum is exported from Canada almost entirely in the crude form; during 1939 exports of crude grades totalled 1,260,231 tons valued at \$1,390,126 compared with 810,109 tons at \$932,742 in 1938. Of the 1939 exports, 1,191,389 tons were consigned to the United States and 62,665 to the United Kingdom. In addition to exports of crude gypsum in 1939, there were exported 1,339 tons of plaster of Paris and prepared wall plaster and 224 short tons of ground gypsum valued at \$1,342.

The Nova Scotia Department of Mines reported that the Canadian Gypsum Company Limited operating at Wentworth, Hants County, had its largest production in 1939. This Company opened a new quarry here with a face about 400 feet long and about 200 feet wide, with a height of about 60 to 70 feet. The Retreat quarry of the Company was opened by driving a tunnel south from the floor of the Fraser quarry through 500 feet of anhydrite and raising up through to the surface on a bed of soft white gypsum.

The Connecticut Adamant Plaster Company operates a quarry at Cheverie, Hants County. It is located about two miles from the shipping pier and has a face 18 feet high which has been opened for about 500 feet. The overburden which is not heavy is stripped by a gasoline shovel. The gypsum is quarried and shipped to New Haven, Conn.

In 1939, Gypsum, Lime and Alabastine (Canada) Limited commenced quarry operations on its property located at Baddeck Bay, Nova Scotia. This property was formerly owned and operated by the North American Gypsum Company. Diamond drilling was carried out in the fall of 1938 and during the winter months of 1939. In the spring, quarry operations were begun upon a large area of high-grade gypsum located directly north of the shipping pier at the head of Baddeck Bay.

National Gypsum (Canada) Limited continued operations in 1939 at their quarry located at Cheticamp, Inverness County, Nova Scotia. The quarry faces operated in 1938 were extended and the same method of breaking down the gypsum was continued. This consists of drilling six-inch holes the full height of the quarry face and blasting several of these large holes once each month. Due to a shortage of ships, brought about by the war, shipments of gypsum from this quarry were greatly curtailed.

The National Gypsum Co. also continued operations at Dingwall, Victoria County and at Walton, Hants County. At Dingwall, a new loading pier was completed and dredging operations carried out.

At Cheverie, Nova Scotia, Arthur Parsons operates a quarry upon a deposit of anhydrite exposed on the shore. Small quantities of anhydrite are quarried annually and shipped by steamer to Norfolk, Virginia, where it is used as a fertilizer and moisture retainer around peanut plants; an average of 10 men were employed at this quarry in 1939.

At Little Narrows, Victoria County, on the Bras d'Or Lakes, the Victoria Gypsum Company Limited carried on work in 1939. The quarry operations are conducted about 3,000 feet inland from the shipping pier and the maximum height of the gypsum is 20 feet.

The Windsor Plaster Company Limited opened a quarry located between Brooklyn and Newport, Nova Scotia. The mineral is a good quality of white gypsum and is transported to the plant in Windsor by trucks. All gypsum quarried by the Company is treated in its manufacturing plant and the products sold in the form of selenite hardwall, plaster of Paris, etc.

In 1854, Calvin Tompkins migrated from the State of New York and began the manufacture of the gypsum which is found in abundance and of excellent quality near Hillsborough, Albert County, New Brunswick. That was the beginning of the important industry which is now carried on here by the Canadian Gypsum Company Ltd. The properties at present mined are in the vicinity of Hillsborough and the gypsum as mined, is hauled direct by locomotive from the mines to the manufacturing plant of the Company.

At Plaster Rock, New Brunswick, gypsum was mined and crushed in 1939 by Donald Fraser. Operations were conducted during May, September and December and a relatively small tonnage of crushed gypsum was exported to the United States.

Production of gypsum in Ontario comes from the properties of Gypsum, Lime and Alabastine, Canada, Limited and the Canadian Gypsum Company Limited. During 1939 operations were conducted steadily by the first-named Company at Caledonia and the Company states, in part: "Notwithstanding the fact that we are at war, the consensus of opinion seems to be that 1940 will be one of increasing business activity for Canada. . . . These factors may be offset to some extent by the building of military structures and extensions for industrial expansion in which we hope to participate. . . ."

At Hagersville, Ontario, the Canadian Gypsum Company Limited carried on mining and milling operations continuously throughout the year. Underground mining methods are employed at both the Caledonia and Hagersville properties.

Gypsum was mined in Manitoba during 1939 by Gypsum, Lime and Alabastine, Canada, Limited, at Gypsumville, and at Amaranth by Western Gypsum Products Ltd.; the latter Company operates a mill and manufacturing plant in Winnipeg. Production in 1939, as recorded for British Columbia, represents the output of the Gypsum, Lime and Alabastine, Canada, Limited. Gypsum is mined by the Company at Falkland and milling and manufacturing are conducted at New Westminster. The mine or quarry was in operation from March 1 to December 15.

Table 239.—Production in Canada, Imports and Exports of Gypsum, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
SHIPMENTS BY GRADES—				
Crude (1)—Lump or mine run.....	17,030	20,391	27,912	34,406
Crushed.....	892,028	939,073	1,288,796	1,304,035
Fine ground.....	473	2,489	412	2,490
Calcined gypsum (2).....	99,268	540,312	104,814	594,196
Total.....	1,008,799	1,502,265	1,421,934	1,935,127
SHIPMENTS BY PROVINCES—				
Nova Scotia.....	870,856	908,383	1,298,618	1,340,830
New Brunswick.....	48,418	159,203	29,765	134,286
Ontario.....	57,503	242,470	59,440	260,792
Manitoba.....	14,571	92,129	15,961	98,578
British Columbia.....	17,451	100,080	18,150	100,641
Total.....	1,008,799	1,502,265	1,421,934	1,935,127
Total gypsum mined and quarried (1).....	1,084,057		1,532,423	
Total gypsum calcined (2).....	122,710		138,163	
IMPORTS—				
Gypsum, crude (sulphate of lime).....	8	212	3	52
Gypsum, ground, not calcined.....	418	13,602	695	18,075
Plaster of Paris or gypsum, calcined, and prepared wall plaster....	1,326	25,464	1,520	30,225
Total.....	1,752	39,278	2,218	48,352
EXPORTS—				
Gypsum, ground.....			224	1,342
Gypsum or plaster, crude.....	(b) 810,109	932,742	(a) 1,260,231	1,390,126
Plaster of Paris, ground, and prepared wall plaster.....	1,458	34,004	1,339	33,727
Total.....		966,746		1,425,195

(1) Includes some anhydrite quarried in Nova Scotia.

(2) Does not include gypsum calcined in manufacturing plants located in Montreal and Calgary.

(a) 1,191,389 tons at \$1,318,643 to United States and 62,665 tons at \$64,589 to United Kingdom.

(b) 675,734 tons valued at \$793,196 to United States and 134,375 tons at \$139,546 to United Kingdom.

"Mineral Trade Notes" (May 20, 1939) of the United States Department of the Interior refers to the use of gypsum in Germany as follows: "There has been a shortage of sulphuric acid in Germany for several years and it has been difficult to secure adequate supplies of foreign iron pyrites because of adverse foreign exchange. In 1937 production could not keep pace with requirements of the superphosphate and nitrogen fertilizers, and for stretching the supplies of sulphuric acid, Germany resorted again to the substitution of gypsum for producing ammonium sulphate".

Table 240.—Production (Sales) of Crude and Calcined Gypsum in Canada, 1930-1939

Year	Tons	Value
		\$
1930.....	1,070,968	2,818,788
1931.....	863,752	2,111,517
1932.....	438,629	1,080,379
1933.....	382,736	675,822
1934.....	461,237	863,776
1935.....	541,864	932,203
1936.....	833,822	1,278,971
1937.....	1,047,187	1,540,483
1938.....	1,008,799	1,502,265
1939.....	1,421,934	1,935,127

Table 241.—Annual Production of Gypsum in Canada, by Provinces, 1935-1939

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value†
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1935....	454,703	523,216	30,796	105,960	38,247	164,807	10,500	85,885	7,618	52,335	541,864	932,203
1936....	729,019	808,294	38,470	123,560	40,191	182,783	12,064	87,076	14,078	77,258	833,822	1,278,971
1937....	926,796	978,288	36,906	131,727	53,780	233,895	13,941	88,095	15,764	108,478	1,047,187	1,540,483
1938....	870,856	908,383	48,418	159,203	57,503	242,470	14,571	92,129	17,451	100,080	1,008,799	1,502,265
1939....	1,298,618	1,340,830	29,765	134,286	59,440	260,792	15,961	98,578	18,150	100,641	1,421,934	1,935,127

† Gross.

Table 242.—Consumption of Gypsum in Canadian Cement Industry, 1930-1939

Year	Tons	Year	Tons
1930.....	74,227	1935.....	21,611
1931.....	56,677	1936.....	25,447
1932.....	27,537	1937.....	33,691
1933.....	13,319	1938.....	51,975
1934.....	19,172	1939.....	31,492

Table 243.—Principal Statistics of the Gypsum Mining Industry in Canada, 1937-1939

	Nova Scotia	New Brunswick, Ontario, Manitoba, British Columbia	Canada
Number of firms—1937.....	5	(*) 4	8
1938.....	5	(*) 5	9
1939.....	7	(a) 3	10
Capital employed—1937..... \$	4,178,656	2,723,566	6,902,222
1938.....	4,395,198	2,930,214	7,325,412
1939.....	4,370,893	2,436,014	6,806,907
Number of employees—On Salary—			
1937.....	25	36	61
1938.....	28	32	60
1939.....	29	37	66
—On Wages—			
1937.....	312	229	541
1938.....	324	239	563
1939.....	440	208	648
Salaries and wages—Salaries—			
1937..... \$	44,903	65,469	110,372
1938.....	48,398	55,068	103,466
1939.....	53,680	59,235	112,915
—Wages—			
1937..... \$	267,875	217,149	485,024
1938.....	251,516	173,045	424,561
1939.....	402,134	177,109	579,243
Fuel and electricity—Cost—			
1937..... \$	67,743	88,372	156,115
1938.....	63,102	86,047	149,149
1939.....	90,394	103,094	193,488
Value of process supplies used—1937..... \$	67,167	39,795	106,962
1938.....	58,443	31,714	90,157
1939.....	85,166	20,665	105,831
Selling value of products (gross)—1937..... \$	978,288	562,195	1,540,483
1938.....	908,383	593,882	1,502,265
1939.....	1,340,830	594,297	1,935,127

(*) Includes 1 company also operating in Nova Scotia.

(a) Includes 2 companies also operating in Nova Scotia.

Table 244.—Capital Employed in the Gypsum Industry in Canada, by Provinces, 1939

	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$
Capital employed as represented by—			
Present cash value of the land (excluding minerals).....	2,074,803	219,854	2,294,657
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,014,535	834,223	1,848,758
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	112,607	89,299	201,906
Inventory value of finished products on hand.....	127,193	44,007	171,200
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)...	1,041,755	1,248,631	2,290,386
Total	4,370,893	2,436,014	6,806,907

Table 245.—Number of Wage-earners on Payroll or Time Record on the Last Day of Each Month or Nearest Work-day, 1938 and 1939

Month	1938		1939		
	Mine	Mill	Mine		Mill
			Surface	Under-ground*	
January.....	91	134	207	56	93
February.....	92	160	197	59	99
March.....	120	218	311	65	119
April.....	277	181	320	66	234
May.....	388	220	385	66	245
June.....	423	215	497	68	241
July.....	472	235	646	67	193
August.....	449	243	578	67	193
September.....	455	264	627	86	219
October.....	435	222	593	64	193
November.....	368	244	357	64	160
December.....	308	205	173	49	131

* Underground work confined to New Brunswick, Ontario and Manitoba.

(2) The Gypsum Products Industry

Nine Canadian factories, operated by four companies, manufactured gypsum products having a factory selling value of \$3,174,137 during 1939. This output was 27 per cent over the 1938 total of \$2,715,894 and 26 per cent over the 1937 value of \$2,525,507. The main products were gypsum wallboard, gypsum hardwall plaster, gypsum tile and gypsum blocks.

Capital employed in these nine manufacturing plants amounted to \$3,660,233 in 1939, including \$2,237,978 as the value of buildings and equipment, \$435,180 as the value of inventories at the year-end and \$987,075 as cash, bills receivable, etc. The average number of employees in 1939 was 307, to whom \$321,596 was paid in salaries and wages. Expenditures for fuel and electricity amounted to \$129,889 while materials used in manufacturing processes cost \$1,240,763.

Table 246.—Materials Used in the Gypsum Products Industry, 1938 and 1939

Material	Unit of measure	1938		1939	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Gypsum, crude.....	short ton	18,528	69,598	19,946	75,000
Gypsum, calcined (plaster of Paris).....	short ton	9,441	505,693	105,397	552,527
Paper.....	short ton	5,143	253,175	5,601	265,187
Starch or paste.....	short ton	186	29,217	112	9,875
Hair.....	short ton	110	19,641	418	35,636
Retarder.....	short ton	367	15,772	271	16,238
Sawdust or shavings.....	short ton	369	2,927	576	5,351
Containers, etc.....	xxx		98,989		113,643
All other materials.....	xxx		128,938		167,306
Total.....	xxx		1,123,950		1,240,763

Table 247.—Output of the Gypsum Products Industry, 1938 and 1939

Products	Unit of measure	1938		1939	
		Quantity	Selling value at works	Quantity	Selling value at works
			\$		\$
Gypsum wallboard.....	sq. ft.	61,860,550	1,451,853	78,147,747	1,744,895
Gypsum hard wall plasters.....	short ton	66,730	920,597	69,853	959,154
All other products (*).....	xxx		343,444		470,085
Total.....	xxx		2,715,894		3,174,137

(*) Includes gypsum tile, gypsum blocks, etc.

Table 248.—World Production of Gypsum, 1937, 1938 and 1939

(Supplied by Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	1,094,109	1,092,395	.....	Latvia (exports).....	193,802	193,853	.....
Eire.....	11,463	13,153	.....	Luxemburg.....	19,411	19,587	.....
Union of South Africa.....	36,582	38,490	40,138	Portugal.....	11,210	8,893	12,872
Canada.....	1,027,736	967,900	1,368,235	Roumania (b).....	69,515	66,350	.....
Cyprus (estimated).....	15,000	12,000	.....	Sweden.....	106	(a)	.....
Palestine.....	3,872	3,921	4,453	Yugoslavia (estimated)....	10,000	10,600	.....
India.....	46,090	69,823	.....	Algeria.....	39,462	32,799	.....
Australia.....	155,209	173,400	.....	Egypt (b).....	249,634	208,738	689,016
				Morocco (Spanish) (exports)	924	1,147	.....
FOREIGN COUNTRIES				Tunis (estimated).....	22,400	(a)	.....
Austria.....	48,000	(a)	.....	Mexico.....	(c) 70,000	(c) 70,000	.....
Estonia.....	12,547	13,695	.....	United States.....	2,730,505	2,396,612	2,881,015
France.....	1,300,000	(a)	.....	Argentina.....	67,143	69,695	85,949
Germany.....	1,657,000	(a)	.....	Brazil (estimated).....	2,000	2,000	2,000
Greece.....	17,641	16,349	.....	Chile.....	21,500	(a)	21,858
Italy (including alabaster).....	409,625	419,359	.....	Peru.....	12,691	13,804	.....
				China (estimated).....	70,000	70,000	.....
				New Caledonia.....	364	1,053	.....

Gypsum is also produced in Poland, Spain, Switzerland, U.S.S.R., French Morocco, Cuba, Japan and Korea.

(a) Information not available.

(b) Converted from cubic metres at the rate of 1 cubic metre = 2 long tons. Includes alabaster.

(c) Estimated.

IRON OXIDES (OCHRE) MINING INDUSTRY

Production (Producers' Sales) in Canada of iron oxides and ochres, crude and refined during 1939 totalled 6,015 short tons valued at \$88,418 compared with 5,821 short tons worth \$71,769 in 1938. Of the 1939 output 5,465 short tons valued at \$82,501 came from properties in the Province of Quebec and the balance of 550 tons at \$5,917 represented crude material shipped from deposits located in British Columbia.

During 1939 commercial shipments of iron oxides or ochres were made in the province of Quebec from deposits occurring at La Pointe du Lac and Les Forges in St. Maurice county; Almaville in Laviolette county; Marchand township in Labelle county and Red Mill and St. Adelphe in Champlain county. The production as reported for British Columbia came from bog deposits located at Alta Lake and from oxide beds in the Windermere district.

The Bureau of Mines, Ottawa, reports that the present producing localities have met the requirements of the domestic pigment trade for cheaper grades for many years past. Other prospective deposits could, if necessary, be drawn upon in Quebec and Ontario; deposits of ochre also occur in Nova Scotia, Manitoba, Saskatchewan, Alberta and British Columbia.

The larger part of the tonnage recorded as annual production of iron oxides in Canada represents crude material for use in the purification of heating and illuminating gas, whereas the calcined or higher grades are produced for use in the manufacture of paints and pigments.

Imports into Canada of ochres, ochrey earths, siennas and umbers during 1939 totalled 1,547 tons valued at \$56,873 compared with 1,166 tons worth \$37,631 in 1938. In 1939 Canadian exports of mineral pigments, iron oxides, ochres, etc., totalled 173 tons valued at \$15,612 as against 1,685 tons worth \$104,814 in the preceding year.

In 1939 there were seven Canadian firms reporting commercial mine shipments of iron oxides, five in the province of Quebec and two in British Columbia; capital employed by the entire industry totalled \$215,445; \$26,916 in salaries and wages were distributed to 38 employees and \$8,194 were expended for fuel, electricity and various process supplies.

Table 249.—Production in Canada, Imports and Exports of Iron Oxides, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
PRODUCTION (SALES) (*)—				
Quebec.....	5,387	67,209	5,465	82,501
British Columbia.....	434	4,560	550	5,917
Total.....	5,821	71,769	6,015	88,418
IMPORTS—				
Ochres, ochrey earths, siennas and umbers.....	1,166	37,631	1,547	56,873
Oxides, fireproofs, rough stuff, fillers and colours, dry, n.o.p.....	3,038	718,329	3,174	954,927
EXPORTS—				
Mineral pigments, iron oxides, ochres, etc.....	1,685	104,814	173	15,612

(*) Includes both crude and refined.

Table 250.—Production of Iron Oxides in Canada, 1930-1939

Year	Quantity	Value
	Short tons	\$
1930.....	6,596	83,873
1931.....	5,520	49,205
1932.....	5,240	46,161
1933.....	4,357	53,450
1934.....	4,959	66,166
1935.....	5,516	77,075
1936.....	5,854	69,630
1937.....	6,197	83,640
1938.....	5,821	71,769
1939.....	6,015	88,418

The production of iron oxides in Canada since the first recording of statistics in 1886 to the end of 1939 totalled 287,385 short tons valued at \$2,867,964.

Table 251.—Consumption of Iron Oxides in Specified Canadian Industries, 1932-1939

Years	Coke and Gas		Paints, pigments and varnishes			
			Iron oxide pigments		Ochres, siennas and umbers	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons (a)	\$	Tons	\$	Tons	\$
1932.....	3,736	35,284	701	52,323	512	48,047
1933.....	2,734	29,076	504	43,826	491	43,671
1934.....	3,757	47,010	580	53,539	544	53,236
1935.....	3,701	46,204	990	77,758	564	56,219
1936.....	(b)	41,291	733	67,850	634	65,819
1937.....	(b)	40,414	890	81,709	566	49,082
1938.....	(b)	41,013	822	70,736	487	41,062
1939.....	(b)	35,417	882	80,274	523	46,134

(a) Oxide and purifying materials. (b) Data not available.

Prices.—CANADIAN—April, 1940*

Iron Oxides—Red.....2 cents to 7 cents per pound.
 Yellow.....5 cents to 7 cents per pound.
 Brown.....5 cents to 8 cents per pound.
 Black.....9 cents to 12 cents per pound.
 Ochres.....2 cents to 4 cents per pound.
 Siennas.....5 cents to 7½ cents per pound.
 Umbers.....5 cents to 8 cents per pound.

* Canadian Chemistry and Metallurgy, Toronto.

Prices†—UNITED STATES—March, 1940.

Iron Oxide per pound: standard (No. 1 quality) Spanish red, 3 to 4 cents nominal; domestic earth 2½ to 3½ cents.

Ochre per ton, f.o.b. Georgia mines; \$19 in sacks; \$22.50 in barrels. Buff clay, 98 per cent through 325 mesh, \$19. F.O.B. Virginia, dark yellow, 300 mesh, 60 per cent ferric oxide, in jute bags \$19.50.

† Engineering and Mining Journal—Metal and Mineral Markets—New York.

Table 252.—Principal Statistics of the Natural Iron Oxides Industry in Canada, 1938 and 1939

	1938	1939
Number of firms	(a) 6	(b) 7
Capital employed..... \$	200,057	215,445
Number of employees—On salaries.....	5	6
On wages.....	32	32
Total.....	37	38
Salaries and wages—Salaries..... \$	7,900	7,936
Wages..... \$	23,657	18,980
Total..... \$	31,557	26,916
Selling value of products (gross)..... \$	71,769	88,418
Cost of fuel and purchased electricity..... \$	7,931	8,094
Cost of process supplies..... \$	193	100
Selling value of products (net)..... \$	63,645	80,224

(a) Five (5) producing in Quebec and one (1) in British Columbia.
in British Columbia.

(b) Five (5) producing in Quebec and two (2)
in British Columbia.

Table 253.—Capital Employed in the Iron Oxides Industry in Canada, 1939

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	44,276
Present value of buildings, fixtures, machinery, tools and other equipment.....	121,048
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	27,814
Inventory value of finished products on hand.....	18,207
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,100
Total.....	215,445

Table 254.—Wage-earners Employed, by Months, 1938 and 1939

Months	Number				Months	Number			
	1938		1939			1938		1939	
	Mine	Mill	Mine	Mill		Mine	Mill	Mine	Mill
January.....		21			July.....	30	17	32	14
February.....	18	20	3	17	August.....	28	18	45	14
March.....	18	5	3	20	September.....	22	17	42	15
April.....	13	5		20	October.....	14	20	19	19
May.....	13	17		20	November.....	5	18	11	20
June.....	27	16	28	17	December.....			6	20

THE MICA MINING INDUSTRY

Production (Producers' Sales) of mica in Canada during 1939, including sales from stock, totalled 2,135,356 pounds valued at \$147,321 compared with 1,037,026 pounds valued at \$80,989 in 1938; comprising the 1939 output were 1,792,091 pounds of scrap and ground mica valued at \$18,419; 92,333 pounds of knife trimmed at \$38,370; 176,051 pounds of splittings at \$83,633; 68,181 pounds of thumb trimmed at \$6,832 and 6,700 pounds of rough cobbled worth \$67. Of the 1939 shipments, mines in the Province of Quebec contributed 867,396 pounds valued at \$122,243, Ontario 1,127,960 pounds at \$22,978 and British Columbia an output valued at \$2,100.

In 1939 phlogopite mica was shipped from properties chiefly located in the Hull-Buckingham district of Quebec and in Eastern Ontario from deposits occurring in the Kingston-Perth area. The production of sheet mica in Canada is almost wholly of the phlogopite or amber mica variety. It is derived almost entirely from adjacent sections of Ontario and Quebec, within an area extending roughly from Kingston, Ontario, northeastward into Hull and Papineau counties, Quebec; a few scattered amber mica occurrences are also known in the Province of Quebec as far east as Quebec City, but very little mining has been conducted on them.

Production of muscovite, or white mica, in Canada has been negligible, small amounts have been recovered occasionally as a by-product from feldspar mining in general. The proportion of sound, merchantable sheet mica in Canadian pegmatites has proved too low for profitable mining for this mineral alone. In 1939 a small production of this class of mica came from a deposit in Boyd township, Ontario, while in Quebec during 1939 muscovite was mined or shipped from deposits located at Lac Duclair, Bergeronnes township, Saguenay county; Lacoste township, Charlevoix county; Baie des Bacons and the townships of B  gin and Harvey, Chicoutimi county; shipments of ruby muscovite were reported from Grand Lac Ste. Agnes de Charlevoix.

In a review of the Canadian Mica Trade, Mr. Hugh S. Spence of The Bureau of Mines, Ottawa, states—"Sheet mica is marketed in various classes, depending on the amount of preparation the mine-run material receives. Much of the Canadian output was sold formerly in the semi-rough form, termed 'thumb-trimmed', but the trade now calls largely for 'knife-trimmed', a much higher grade of product. Price is governed largely by dimensions of sheet, and rises rapidly for larger sizes. Quality, which is gauged by colour, softness, ability to split readily, as well as freedom from cracks, creases, pin-holes and inclusions of foreign mineral substance, is also highly important. Good di-electric strength is a prime consideration, but most amber mica, except perhaps the very dark, high iron varieties, possess this in the required degree. For heater use, the mica must be able to withstand a temperature up to red heat without puffing or swelling. The use of sheet mica is almost entirely for electrical insulation. It is cut or punched into an enormous variety of shapes and sizes, and in the form of splittings is bonded and pressed into large sheets that can be sawn, bored and machined into any desired article. Mica is used in making heavy-duty spark plugs for aeroplanes. Although the muscovite variety fills by far the largest share of the world mica demand, amber mica is essential for certain purposes, more especially where high-resistance is demanded. Although already drawn on extensively, Canadian reserves of amber mica are held to be still adequate to furnish important supplies, and any material price advance would probably result in a revival of mining and increased production. Canada shares the world market for amber mica with Madagascar. Fine flake or powdered mica has become an important industrial product, particularly in the United States, where a number of plants are engaged in its manufacture both by wet and dry systems of grinding. Most of this production goes to the roofing and rubber trade. New uses for the material include its combination with resin varnishes as a coating for foodstuff cans, and as a base in cleanser compounds. Increased interest is also being shown in its possibilities as a protective inert pigment in paints. Large amounts of wet-ground muscovite mica are consumed in wall paper manufacture.

"Mica prices are difficult to ascertain, owing to the lack of reliable market quotations and to the system of trade discounts obtaining. Quality has also such a bearing on value that the only satisfactory method of getting information is to submit samples to an accredited dealer for a quotation."

Plants now exist in Canada for the expanding by heat processing of the hydrated variety of mica known as vermiculite. This mineral expands tremendously when heated, yielding an exceedingly light weight product, which is finding wide application for heat and sound-insulation. In 1938, it was reported that all Canadian plants drew their supply of crude vermiculite from a deposit at Libby, Montana. No occurrences of this class of mica are known in Canada, though there have been unconfirmed reports of discoveries in British Columbia.

It is stated that in the mica deposits of the Palabora district, northeastern Transvaal, vermiculite persists down to between 50 and 60 feet, below which there is a gradual transition to phlogopite; in addition to this type of deposit, there are those in which vermiculite and apatite are associated.

Imports into Canada of mica and mica manufactures were appraised at \$61,835 in 1939 compared with \$86,803 in 1938. Exports of Canadian mica, including all grades, during 1939 were valued at \$165,252 against a corresponding value of \$89,259 in the preceding year.

Table 255.—Production of Mica in Canada, by Provinces, 1930-1939

Year	Quebec		Ontario†		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
1930.....	430	61,729	740	34,275	1,170	96,004
1931.....	290	30,601	1,049	23,465	1,339	54,066
1932.....	41	4,076	268	2,752	309	6,828
1933*	256	39,060	666	9,371	944	49,284
1934*	322	85,967	618	9,059	998	97,071
1935.....	373	74,894	255	7,144	628	82,038
1936.....	272	63,123	529	11,433	801	74,556
1937.....	546	124,594	399	9,137	945	133,731
1938*	218	72,982	252	6,445	518	80,989
1939.....	434	122,243	634	25,078	1,068	147,321

* Total for Canada includes 22 tons valued at \$853 produced in British Columbia in 1933, 58 tons valued at \$2,045 in 1934 and 48 tons at \$1,562 in 1938.

† In 1939 includes production of mica schist in British Columbia.

Table 256.—Production of Mica in Canada, by Grades, 1938 and 1939

	1938			1939		
	Quantity	Value, f.o.b. shipping point	Price per pound	Quantity	Value, f.o.b. shipping point	Price per pound
	Pounds	\$	\$	Pounds	\$	\$
Rough cobbled.....	12,000	360	0.03	6,700	67	0.01
Knife-trimmed.....	81,127	45,419	0.56	92,333	38,370	0.42
Thumb-trimmed.....	17,050	4,366	0.26	68,181	6,832	0.10
Splittings.....	51,434	22,456	0.44	176,051	83,633	0.48
Scrap*	875,415	8,388	0.009	1,792,091	18,419	0.01
Total.....	1,037,026	80,989		2,135,356	147,321	

* Includes ground mica.

Table 257.—Imports and Exports of Mica, 1938 and 1939

	1938		1939	
	Pounds	Value	Pounds	Value
		\$		\$
IMPORTS—				
Mica and manufactures of, n.o.p.—				
From—United Kingdom.....		11,603		4,532
United States.....		53,602		46,696
British India.....		21,583		10,583
Germany.....		1		
Other countries.....		14		24
Total.....		86,803		61,835
Chalk, China, Cornwall or cliff stone and mica schist.....		22,572		22,831
EXPORTS—				
Mica, rough cobbled, knife-trimmed and thumb-trimmed—				
To—United Kingdom.....	68,800	46,734	26,100	19,887
United States.....	24,900	3,864	118,900	15,936
Other countries.....	24,500	7,312	24,700	7,101
Mica, scrap and waste—				
To—United States.....	1,288,600	7,649	1,969,100	12,514
Other countries.....			2,000	11
Mica splittings—				
To—United Kingdom.....				
United States.....	13,200	5,810	78,500	34,737
Japan.....	35,800	16,333	150,000	74,086
Mica plate and manufactures of (micanite).....		1,507		980
Total.....		89,259		165,252

Table 258.—Consumption of Mica in Canada, by Industries, as Reported to the Annual Census of Industry, 1938 and 1939

	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
In Electrical Apparatus Industry.....		66,877		83,355
In Rubber Industry.....	64	6,039	94	9,423
In Roofing Industry (a).....	215	13,040	316	19,271
In Mica Manufacturing Industry.....	28	13,416	186	17,079
Total accounted for.....		99,372		129,128

(a) Includes mica used in manufacture of wall paper and by coal tar distillation industries.

The following mica prices for February, 1940, are supplied by "Metal and Mineral Markets"—New York—Per ton, f.o.b. New Mexico, scrap, white, \$16; off color, \$12. Punch, white, for disks, per lb., 12c.; for washers, 10c. Per ton, f.o.b. New Hampshire, roofing mica, \$23; snow, \$34; 40 mesh white, \$40; 60 mesh, \$48; 100 mesh, \$60; 200 mesh, \$75. Clean dry mixed bench and mine scrap, \$14. Per lb., f.o.b. North Carolina: Punch, 8 to 10c.; 1½ x 2 in., 30 to 35c.; 2 x 2, 50 to 60c.; 3 x 3, \$1.25 to \$1.35; 3 x 4 in., \$1.50 to \$1.60; 3 x 5, \$1.75 to \$2.00; 4 x 6, \$2.75 to \$3.00; 6 x 8, \$4.25 to \$4.50; 8 x 10, \$8.25. The above prices apply to No. 1 and No. 2 quality stock. Stained qualities take from 25 to 50 per cent discount. White North Carolina mica, 70 mesh, \$60 to \$80 a ton. Biotite, or black mica, \$15 a ton, unground. White, Georgia, 300 mesh, \$19.50; ground roofing, 20 mesh, \$17.50; sericite, 300 mesh, \$15; mica schist, 20 mesh, \$14.

Table 259.—Principal Statistics of the Mica Mining Industry in Canada, 1938 and 1939

	1938	1939		
	Canada (*)	Quebec	Ontario	Canada (*)
Number of firms or operators.....	40	38	22	61
Capital employed..... \$	159,758	194,418	35,919	230,337
Number of employees—				
On salary.....	9	9	2	11
On wages.....	147	182	31	213
Total.....	156	191	33	224
Salaries and wages—				
Salaries..... \$	6,419	6,844	2,190	9,034
Wages..... \$	68,005	93,216	10,403	103,619
Total..... \$	74,424	100,060	12,593	112,653
Selling value of products (gross)..... \$	80,989	122,243	22,978	147,321
Cost of fuel and electricity..... \$	5,529	6,999	571	7,570
Cost of process supplies used..... \$	13,718	11,251	193	11,444
Selling value of products (net)..... \$	61,742	103,993	22,214	128,307

(*) Does not include data for one operation in British Columbia for which statistics are not available.

Table 260.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1939

	Quebec	Ontario	Canada†
	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—			
Present cash value of the land (excluding minerals).....	74,359	24,360	98,719
Present value of buildings, fixtures, machinery, tools and other equipment.....	40,396	7,370	47,766
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	40,498	2,016	42,514
Inventory value of finished products on hand.....	250	1,510	1,760
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	38,915	663	39,578
Total.....	194,418	35,919	230,337

† Does not include data for 1 property in British Columbia.

Table 261.—Number of Wage-earners on Payroll or Time Record on the Last day of Each Month or Nearest Work Day, 1938 and 1939

Month	1938			1939		
	Mine	Shop		Mine	Shop	
		Male	Female (a)		Male	Female (b)
January.....	96	68	8	45	23	38
February.....	100	55	8	47	33	38
March.....	89	38	6	42	32	38
April.....	83	37	6	56	27	38
May.....	101	38	.....	60	40	38
June.....	103	43	.....	112	41	44
July.....	108	39	.....	133	44	74
August.....	104	51	.....	136	50	76
September.....	116	42	.....	130	65	71
October.....	112	32	.....	129	64	73
November.....	108	31	.....	100	64	83
December.....	74	30	6	91	69	83

(a) Does not include outside workers.

(b) Includes outside workers who are assumed to be chiefly girls.

Table 262.—World Production of Mica, 1937, 1938 and 1939

(Imperial Institute, London)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES			
Northern Rhodesia.....	4	4	2	Italy.....	24	120	.....
Southern Rhodesia.....	16	13	6	Norway (exports).....	41	102	.....
Tanganyika Territory—				Roumania.....	27	22	18
Sheet.....	33	22	36	Sweden.....	67	129	.....
Waste.....	40	14		Eritrea.....	(a)	(a)	.....
Union of South Africa (scrap)	1,712	1,098	956	Madagascar.....	574	667	.....
Canada—				United States (sales)—			
Knife trimmed.....	91	36	41	Sheets (uncut).....	756	419	363
Thumb trimmed.....	78	8	30	Scrap.....	22,496	18,087	22,029
Splittings.....	32	23	79	Argentina.....	221	246	293
Rough cobbled.....	48	5	3	Bolivia (exports).....	9	4	.....
Scrap.....	595	391	800	Brazil (exports).....	325	513	428
Ceylon (exports).....	1	.....	.....	Peru (exports).....	5	24	11
India (exports)—				Korea.....	(a)	(a)	.....
Blocks.....	1,500	942					
Splittings.....	7,467	4,713	9,460				
Scrap.....	5,900	3,101					
Australia.....	84	65	.....			
New Zealand.....	.....	.....	1				

Mica is also produced in the U.S.S.R.

(a) Information not available.

(c) Converted from cubic metres at the rate of 1 cubic metre = 2 long tons.

The following amounts of lithia mica were produced (long tons):—

	1937	1938	1939
South West Africa.....	1,030	.....	423
Canada.....	(£342)	.....	.....
France.....	(a)	(a)	.....
Portugal.....	109	.....	.....
United States (lithium minerals).....	1,212	796	1,777
Argentina.....	181	(a)	.....

THE SALT INDUSTRY

Commercial production of common salt or sodium chloride in Canada during 1939 totalled 424,500 short tons valued at \$2,486,632 compared with 440,045 short tons at \$1,912,913 in 1938. In 1939 salt was produced in Nova Scotia, Ontario, Manitoba and Alberta and of the total Canadian output in 1939 Ontario contributed 370,843 short tons or 87 per cent. Statistics of Canadian salt production represent the recovery of the mineral from brine wells with the exception of Nova Scotia where the output comes entirely from the underground mining of rock salt deposits.

Of the total salt used or sold in 1939 there were 187,958 short tons or 44 per cent consumed directly by the producers themselves in the manufacture of caustic soda and other chemicals. Table and dairy grades sold were recorded at 70,390 short tons, 8,156 tons were reported as sold as highway salt while the balance of production totalling 157,996 short tons included common fine, common coarse and various other grades.

The number of Canadian firms reporting primary salt production in 1939 totalled 9; capital employed by the industry amounted to \$4,447,204 of which \$3,085,024 represented the value of buildings, machinery, etc., and \$274,326 the value of land. Employees numbered 547, including 65 female workers. Salaries and wages totalled \$741,736; \$276,267 were expended for fuel and electricity and \$37,161 for chemicals and other process supplies.

Imports of salt into Canada during 1939 totalled 117,629 short tons valued at \$507,368 compared with 108,131 short tons at \$453,765 in 1938. Included in the 1939 imports were 34,646 short tons for the use of sea and gulf fisheries. Exports of Canadian salt during 1939 totalled 10,656 short tons appraised at \$76,287. The total "apparent" consumption of salt in Canada in 1939, for all purposes, and in all forms was estimated at 531,473 short tons valued at \$2,917,713 compared with 536,332 short tons worth \$2,298,385 in 1938.

Statistics relating to Canadian salt production are available only since 1886 and Canadian salt production since that year to the end of 1939 totalled 8,413,987 short tons valued at \$48,050,840.

In a review of the Canadian salt industry in 1939 L. H. Cole, of the Bureau of Mines, Ottawa, states in part:—"In Nova Scotia, the Malagash Salt Company continued underground development by diamond drilling, cross cutting, and drifting. Definite zones in which indications of potash salts occur have been correlated from the second level to the twenty-sixth level and there seems to be an increase in the potash content with depth. The study of these zones is being continued.

"Further drilling by New Brunswick Gas and Oilfields Limited, near Weldon, New Brunswick, extended the area known to be underlain by glauberite-salt strata, so that to date a deposit of salt is already indicated more than 1½ miles wide and 4 or more miles long; the greatest thickness so far encountered being 1,500 feet. There are many millions of tons of salt in this basin, available for future development.

"Soil stabilization with salt and clay for the foundation of highways, and for a surface veneer for gravel roads is now firmly established, and this use of salt showed increase during the year. The development of soil stabilized bases for runways at Canadian airports continued and several new airfields were so prepared.

"The eastern half of Canada is well supplied with deposits of salt, and already two plants are in operation west of Winnipeg."

Table 263.—Production of Salt in Canada, by Grades, 1938 and 1939

	1938			1939		
	Manu- factured	Sold	Value of salt sold (not includ- ing contain- ers)	Manu- factured	Sold	Value of salt sold (not includ- ing contain- ers)
	Tons	Tons	\$	Tons	Tons	\$
Table dairy and pressed blocks.....	83,323	85,422	876,204	68,629	70,390	1,223,433
Common, fine.....	101,949	104,174	418,810	85,921	84,106	503,589
Common, coarse.....	32,446	30,613	253,384	27,733	28,704	286,179
Highway salt.....	5,778	10,174	34,689	8,156	8,156	40,501
Land salt.....	88	71	397	288	268	1,697
Other grades.....	44,214	38,653	158,491	46,313	44,918	185,274
Brine for chemical works (salt equivalent sold or used).....	170,938	170,938	170,938	187,958	187,958	245,959
Total.....	438,736	440,045	1,912,913	424,998	424,500	2,486,632
Value of containers.....			576,806			471,350
Grand Total.....	438,736	440,045	2,489,719	424,998	424,500	2,957,982

Table 264.—Production of Salt, by Provinces,* 1930-1939

Year	Nova Scotia		Ontario		Manitoba		Alberta	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1930.....	23,058	136,226	248,637	1,558,405				
1931.....	27,718	143,761	231,329	1,760,388				
1932.....	31,897	150,708	231,138	1,789,751	508	7,002		
1933.....	34,278	161,889	244,107	1,755,087	1,499	18,388		
1934.....	42,886	191,917	276,751	1,734,196	1,664	20,137		
1935.....	38,701	161,659	320,003	1,698,608	1,538	18,765		
1936.....	38,774	183,915	350,044	1,557,078	2,498	32,151		
1937.....	47,865	216,401	407,701	1,539,599	3,391	43,465		
1938.....	44,950	194,759	388,130	1,657,140	2,920	34,979	4,045	46,035
1939.....	47,885	213,029	370,843	2,200,189	2,453	35,888	3,319	37,526

(*) In addition Saskatchewan produced 231 tons valued at \$4,510 in 1933, 452 tons at \$8,703 in 1934 and 101 tons at \$2,046 in 1935.

Table 265.—Production of Salt in Canada, 1930-1939

Year	Tons	\$
1930.....	271,695	1,694,631
1931.....	259,047	1,904,149
1932.....	263,543	1,947,551
1933.....	280,115	1,939,874
1934.....	321,753	1,954,953
1935.....	380,343	1,880,978
1936.....	391,316	1,773,144
1937.....	458,957	1,799,465
1938.....	440,045	1,912,913
1939.....	424,500	2,486,632

Table 266.—Production in Canada, Imports, Exports and Consumption of Salt, 1938 and 1939

	1938		1939	
	Tons	Value	Tons	Value
Production.....	440,045	\$ 1,912,913	424,500	\$ 2,486,632
IMPORTS—				
Salt, for use of the sea or gulf fisheries.....	39,016	110,808	34,646	97,598
Salt, in bulk, n.o.p.....	44,692	169,039	54,659	193,233
Salt, n.o.p. in bags, barrels, etc.....	24,384	172,742	28,313	216,171
Salt, table, made by an admixture of other ingredients, when containing not less than 90 per cent of pure salt.....	41	1,176	11	366
Total.....	108,133	453,765	117,629	507,368
EXPORTS—				
Total.....	11,844	68,293	10,656	76,287
Apparent consumption of salt.....	536,334	2,298,385	531,473	2,917,713

Table 267.—Available Statistics of Consumption of Salt, in Specified Canadian Industries, 1938 and 1939*

Industries	1938		1939	
	Quantity used	Cost at works	Quantity used	Cost at works
	Pounds	\$	Pounds	\$
Fish canning and curing (factories only).....	38,146,100	206,797	42,939,700	212,325
Slaughtering and meat packing.....	72,938,200	391,772	77,119,352	405,238
Acids, alkalies and salts—Brine (salt content) and dry salt.....	398,870,603	332,411	333,004,000	331,797
Soaps and cleaning preparations.....	3,833,557	14,015	4,215,720	17,386
Dyeing, cleaning and laundry work.....	5,155,651	35,282	5,105,994	38,043
Dyeing and finishing of textiles.....	1,971,890	7,972	2,263,589	11,640
Artificial ice.....	1,435,067	6,212	1,782,235	7,685
Abrasives—artificial.....	406,000	1,784	520,000	2,265
Waterworks.....	2,700,000	(a)	3,888,000	(a)
Leather tanneries.....	10,868,261	40,280	12,514,495	55,389
Pulp and paper mills.....	20,686,000	68,485	25,652,000	87,385
Stock and poultry foods.....	4,150,000	27,016	5,428,000	42,439
Bread and other bakery products.....	11,076,372	140,230	15,730,960	144,129
Fruit and vegetable preparations.....	10,108,250	59,102	9,999,969	68,956
Biscuits, confectionery, etc.....	1,771,000	19,043	1,485,969	13,222
Foods, breakfast.....	1,655,734	10,768	1,528,023	10,207
Sausage and sausage casings.....	545,923	7,958	564,139	6,016
Ice cream industry.....	1,200,000	9,561	1,680,840	12,154
Breweries.....	280,544	2,809	412,823	3,434
Malt and malt products.....	265,605	1,179	258,623	1,173
Coffee, tea and spices.....	237,863	2,371	387,470	2,949
Macaroni, vermicelli, etc.....	94,940	770	109,337	1,074
Ice cream cones.....	4,279	33	9,010	91
Foods, miscellaneous.....	937,764	9,596	1,255,111	12,483
Butter and cheese.....		164,815		122,786
Starch and glucose.....	386,043	1,189	455,019	1,607
Animal oils and fats.....	(b)	(b)	180,000	760
Condensed milk.....	(b)	(b)		658
Woollen textiles.....	(b)	(b)		950

(*) In addition, large quantities of salt are used on highways.

(a) Value not compiled.

(b) Not available.

Table 268.—Principal Statistics of the Salt Industry in Canada, 1938 and 1939

	1938	1939
Number of firms†.....	9	9
Capital employed.....	\$ 4,270,795	4,447,204
Number of employees—On salary.....	115	113
On wages.....	447	434
Total.....	562	547
Salaries and wages—Salaries.....	\$ 278,478	285,023
Wages.....	\$ 508,242	456,713
Total.....	\$ 786,720	741,736
Selling value of products (gross).....	\$ 2,489,719	2,957,982
Cost of purchased process materials.....	\$ 30,369	37,161
Cost of fuel and electricity.....	\$ 278,711	276,267
Value of containers.....	\$ 576,806	471,350
Net value of sales.....	\$ 1,603,833	2,173,204

† 6 in Ontario; 1 Nova Scotia; 1 Manitoba; 1 Alberta.

Table 269.—Capital Employed in the Salt Industry in Canada, 1939

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	274,326
Present value of buildings, fixtures, machinery, tools and other equipment.....	3,085,024
Inventory value of materials on hand, salt in process, fuel and miscellaneous supplies on hand.....	295,862
Inventory value of finished products on hand.....	103,592
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	688,400
Total.....	4,447,204

Table 270.—Wage-earners, by Months, 1938-1939. (On 15th or nearest representative date)

Month	1938	1939		
		Male		Female
		Surface	Underground	Surface
January.....	411	359	54	27
February.....	446	348	54	24
March.....	441	329	51	27
April.....	452	342	53	29
May.....	448	356	52	31
June.....	423	370	53	36
July.....	439	372	53	35
August.....	438	335	53	28
September.....	477	345	54	32
October.....	487	366	52	40
November.....	474	363	53	33
December.....	426	332	53	23
Average.....	447	351	53	30

Table 271.—World Production of Salt, 1937, 1938 and 1939

(Imperial Institute)

(Long tons)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				BRITISH EMPIRE—Con.			
Great Britain—				Aden.....	355,166	278,047	.....
Rock-salt.....	18,371	19,658	.....	Burma.....	53,813	38,698	.....
Brine-salt.....	3,052,518	2,610,048	.....	Ceylon.....	38,202	35,914	.....
Northern Ireland—				Cyprus (estimated).....	3,000	3,000	3,000
Rock-salt.....	4,187	2,325	.....	India—			
Brine-salt.....	8,679	5,666	.....	Rock-salt.....	187,100	188,372	.....
Malta.....	1,800	1,800	1,800	Other salt.....	1,305,921	1,351,291	.....
Mauritius (estimated)—				Palestine—			
Sea-salt.....	1,500	1,500	1,500	Rock-salt.....	716	437	635
Nigeria (estimated).....	400	400	400	Sea-salt.....	11,532	7,938	8,598
Somaliland (exports)—				Australia—			
Sea-salt.....	935	347	.....	Western Australia.....	3,670	3,789	5,878
South West Africa.....	4,048	4,991	5,369	South Australia.....	73,558	74,812	.....
Anglo-Egyptian Sudan.....	34,007	(a)	.....	Total*.....	5,700,000	5,200,000	490,000
Kenya.....	(a)	3,199	.....	Total Foreign Countries*.....	29,000,000	27,000,000	.....
Tanganyika Territory.....	8,585	10,006	9,839	World Total*.....	35,000,000	32,000,000	.....
Uganda.....	3,084	3,119	.....			
Union of South Africa (b).....	104,659	(a)	.....			
Canada.....	409,426	391,729	379,463				
British West Indies (exports)—							
Sea salt—							
Bahamas.....	4,924	4,754	24,300				
Turks and Caicos Islands.....	50,030	35,016	49,212				

(a) Information not available. (b) Years ended June 30.

* Salt is also produced in many countries for which statistics are not available, e.g., Gold Coast, Spain, Bolivia.

TALC AND SOAPSTONE INDUSTRY

Production (sales) of primary crude and refined talc and soapstone in Canada during 1939 was valued at \$170,066 compared with \$144,848 in 1938. Production of soapstone during the year under review came entirely from the Eastern Townships of the Province of Quebec while the output of higher grade talc represented shipments made from deposits occurring near Madoc, Hastings county, Ontario.

The talc of the Madoc area is of the foliated variety, has a good white colour, and occurs as a series of vertical veins or bands in white, crystalline dolomite. The mill-output is marketed in nine grades, according to purity and fineness; the products go principally to the textile, cosmetic, rubber, paper and roofing trades, and are marketed chiefly in Canada and the United States, some being exported to Great Britain. In recent years, the total annual production of talc from the Madoc area has averaged around 10,000 to 15,000 tons, divided about equally between the two above-named operators.

In Quebec, substantial amounts of ground soapstone and soapstone sawing dust, as well as a little associated talc, are produced in the Broughton-Thetford Mines district, Eastern Townships, where, in 1939, four operators were active. The talc occurs in the form of narrow seams or veins traversing the soapstone bodies and sometimes also as bands bordering the latter. Part of it, as well as soapstone quarry and sawing waste, is ground in small mills at certain mines, and some is shipped to the grinding plant of Pulverized Products, Ltd., at Montreal; a large proportion of the output goes to the roofing and rubber trades, which also consume most of the soapstone sawing dust.

The Broughton Soapstone Quarry Company, the largest operator, was in intermittent production throughout the year, supplying sawn blocks and bricks for the pulp-mill trade. Shipment is made as far west as Dryden, in western Ontario, but the bulk of the output has found employment in Quebec mills. In addition to furnace stone, the company has fashioned soapstone monuments, stoves, mantels, slabs and other interior trim, as well as a variety of turned ornamental objects and crayons. This concern was the pioneer Canadian producer of soapstone, and has been operating in the Broughton district since 1922. Since 1935, soapstone operations have been conducted in the same district by the following: L. C. Pharo of Thetford Mines, and Charles Fortin of Robertson, both working in Thetford township, and Louis Cyr of St. Pierre de Broughton, in Leeds township. All were operating intermittently during 1939. Broughton Soapstone and Quarry Company considerably expanded its grinding mill during the year; L. C. Pharo also installed grinding equipment in 1938.

The soapstone of the Thetford district occurs as a persistent band or belt traversing the hilly terrain north of the valley of the Quebec Central railway, and outcrops are frequent along the flanks and upper levels of the ridges. The stone ranges from fairly coarse-grained rock to fissile talc schist; it averages 180 pounds to the cubic foot. The schistose variety is the purer stone, and yields a fine grade of off-colour talc powder, substantially free from carbonate and grit, and possessing high slip; it is, however, prone to spall in cutting and handling, for which reason the granular stone is preferred for sawn shapes.

A development that has considerably reduced the demand for soapstone for pulp-mill use is the introduction of a new water-cooled alkali-recovery furnace; this is of steel, only the base being built of soapstone blocks. Such furnaces are being used in a number of Canadian and American mills, and sales of domestic soapstone have fallen off considerably. Increased competition has reduced prices of cut stone to around \$2 per cubic foot, only half the figure formerly obtained.

Further progress was made during the year by the Baker Mining and Milling Company, of Montreal, which for some time past has been planning development of a talc deposit near Highwater, in Potton township, Brome county, Que. Erection of a mill had been completed in 1938, and during 1939 underground work disclosed a substantial width of milling ore. The mill has a capacity of 5 tons per hour of finished products, and embodies a variety of equipment not hitherto employed in Canadian talc-grinding. Some prospecting for talc was done during the year in the Knowlton area, Brome county, where there are a number of old and long-abandoned properties.

So many grades of ground talc are on the market that prices range between very wide limits. Value is dependent largely on purity (governing freedom from grit and slip), colour, particle shape, and fineness of grinding, the specifications for which vary in the different consuming industries. The cheaper, impure, grey tales (in part soapstone) sold in Canada in 1939 at from \$5.50 to \$8 per ton, f.o.b. mills, depending on fineness, which commonly ranges from 80-mesh to 150-mesh; these grades go mainly to the roofing and rubber trades. Quotations for white, foliated talc from the Madoc district were \$30 and \$21 for the two best grades, and \$17 to \$8 for lower grades. Imported superfine Italian talc, cosmetic grade, sells at \$80-\$100 per ton, eastern points.

PYROPHYLLITE

Pryophyllite (hydrous silicate of alumina) is a mineral closely resembling talc in appearance and physical character, and in the ground state can be employed for many of the industrial uses served by the latter mineral. It is, however, far less common than talc and commercial deposits are relatively scarce. Most of the recorded world production is derived from North

Carolina, where there is a growing pyrophyllite industry, a large part of the output going to the ceramic trade. When fired, pyrophyllite does not flux, as does talc, and has value for the manufacture of a wide variety of high-grade ceramic products. Extensive deposits occur in Newfoundland, and in 1935 some material was shipped to Canada for grinding and sale; it is reported that active exploitation of the occurrences is planned, the company interested being the Clinchfield Sand and Feldspar Corporation, of Baltimore, Md., which has already made some considerable shipments.

No important occurrences of this mineral are known in Canada, but some rather low-grade material exists at Kyuquot Sound, on the west coast of Vancouver Island; the deposits are reported to be extensive, but contain much admixed sericite and finely-divided silica. Around 1910, a small quantity was shipped to a Victoria pottery for use in refractories, and to a plant at Esquimalt making polishing powders, soaps, and cleansers. In Quebec, several occurrences of pyrophyllite are recorded in early reports of the Geological Survey of Canada. The mineral appears to be restricted to areas of altered aluminous igneous rocks, notably dacites, trachytes, etc., or of tuffs derived from such rocks, the pyrophyllite originating as a result of their hydrothermal alteration.

Pyrophyllite is currently quoted at \$7.50 to \$12.00 per ton for 200-mesh and 325-mesh material, respectively, f.o.b. North Carolina mills. (Bureau of Mines, Ottawa.).

Table 272.—Production (Sales) in Canada, Imports and Exports of Talc and Soapstone, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
PRODUCTION—				
Soapstone (Quebec) (a).....		35,038		41,471
Talc—Ontario.....	10,853	109,810	13,144	128,595
British Columbia.....				
Total Canada.....		144,848		170,066
IMPORTS—				
Talc or soapstone, ground or unground—				
From—United Kingdom.....			2	140
United States.....	2,301	31,214	2,731	38,814
Italy and Other Countries.....	346	9,172	460	12,426
Total Imports.....	2,647	40,386	3,193	51,380
EXPORTS—				
Talc—				
To—United Kingdom.....	675	5,654	965	8,499
United States.....	6,228	64,629	6,219	66,061
Other Countries.....	48	459		
Total Exports.....	6,951	70,742	7,184	74,560

(a) Shipments usually include relatively small quantities of material classified as low grade talc.

Table 273.—Production of Talc and Soapstone in Canada, 1934-1939

Year	Value	Year	Value
	\$		\$
1934.....	180,777	1937.....	163,814
1935.....	171,532	1938.....	144,848
1936.....	177,270	1939.....	170,066

Table 274.—Consumption of Talc in Canada, by Industries, as Reported in the Annual Census of Manufactures, 1938 and 1939

Industry	1938		1939	
	Short tons	Cost at works	Short tons	Cost at works
Rubber Industry.....	540	\$ 10,641	707	\$ 13,121
Electrical Apparatus.....	149	3,853	194	5,636
Paints.....	2,330	63,788	2,350	59,565
Soaps and Cleansing Preparations.....	241	4,437	365	6,402
Toilet Preparations.....	382	18,934	364	18,872
Polishes.....	17	559	16	495
Products from Imported Clays.....	160	2,119	178	2,502
Prepared Roofing.....	2,414	24,374	3,170	34,307
Pulp and Paper.....	1,051	17,552	1,125	19,363

Table 275.—Principal Statistics of the Talc and Soapstone Industry in Canada, 1938 and 1939

	1938	1939
Number of firms.....	(a) 6	(a) 6
Capital employed.....	\$ 212,491	239,835
Number of employees—On salary.....	6	6
On wages.....	70	59
Total.....	75	65
Salaries and wages—Salaries.....	\$ 9,660	18,130
Wages.....	\$ 49,766	42,382
Total.....	\$ 59,426	60,512
Selling value of products (gross).....	\$ 144,848	170,066
Cost of fuel and purchased electricity.....	\$ 15,993	15,154
Cost of explosives and other process supplies.....	\$ 7,914	7,178
Selling value of products (net).....	\$ 120,941	147,734

(a) 5 firms in Quebec and 1 in Ontario.

Table 276.—Capital Employed, by Classes*, 1939

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	11,983
Present value of buildings, fixtures, machinery, tools and other equipment.....	183,535
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	4,877
Inventory value of finished products on hand.....	11,634
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	27,806
Total.....	239,835

* By active firms.

Table 277.—Wage-earners, by Months, 1938 and 1939

Month	1938	1939		
		Surface	Underground	Mill
January.....	71	12	10	13
February.....	64	15	10	13
March.....	45	18	14	16
April.....	65	10	14	12
May.....	79	21	13	20
June.....	67	40	13	18
July.....	80	40	13	19
August.....	80	42	13	21
September.....	79	42	13	23
October.....	75	45	13	24
November.....	73	47	11	22
December.....	62	29	13	21

Table 278.—World's Production of Talc, 1937, 1938 and 1939

(Taken from the Imperial Institute's Publication—The Mineral Industry of the British Empire and Foreign Countries
(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Tanganyika Territory.....		37		Italy.....	44,987	52,662	
Union of South Africa.....	370	1,529	442	Norway.....	28,998	(a)	
Canada (sales) (b).....	11,122	9,690	11,736	Roumania.....	1,945	2,220	2,581
India.....	13,040	18,590		Sweden.....	7,812	6,690	
Australia.....	1,494	958		Egypt.....	2,230	1,231	820
FOREIGN COUNTRIES				Morocco (French) (exports)	828	(a)	
Austria (estimated).....	25,000	(a)		United States (sales).....	205,356	189,978	226,764
Finland.....	867	409		Argentina.....	205	79	298
France.....	55,400	57,625		Uruguay (exports).....	430	937	
Germany (Bavaria).....	7,667	(a)		French Indo-China.....	421		
Greece.....	1,809	1,273		Manchuria.....	109,384	79,932	

Talc is also produced in U.S.S.R., Spain, and China.

(a) Information not available.

(b) Excluding soapstone, which is only recorded by value and was as follows:—

1936..... £6,600 1937..... £8,200 1938..... £7,100 1939..... £9,000

MISCELLANEOUS INDUSTRIAL OR NON-METAL MINING INDUSTRIES

Included in this section are the following non-metallic minerals and mineral products:—

Barytes	Grindstones	Silica Brick
Corundum	Kyanite	Sodium Carbonate
Diamonds	Lithium Minerals	Sodium Sulphate
Diatomite	Magnesitic Dolomite	Strontium Minerals
Fluorspar	Magnesium Sulphate	Sulphur (Pyrites)
Garnet	Natural Mineral Waters	
Graphite	Phosphate	

Canadian operators producing certain industrial minerals, and who are usually relatively few in number, have been segregated for statistical purposes into a single group designated as the Miscellaneous Non-Metal Mining Industry. Minerals or primary mineral products produced (or deposits developed) by this industry during 1939 included: barytes, diatomite, fluorspar, garnets, graphite, grindstones, lithium minerals, magnesitic-dolomite (crude and refined), magnesium sulphate, mineral waters, phosphate, silica brick, sodium carbonate, and sodium sulphate. For convenience, the sulphur content of pyrites shipped, sulphur recovered from smelter gas, and peat are recorded with the various miscellaneous minerals listed above; the value of sulphur production, however, is not included in the total for the miscellaneous non-metallic or industrial minerals as the value of this element is credited to the copper-gold-silver mining and non-ferrous smelting industries.

The number of firms reported as active in the industry during 1939 was 46; capital employed totalled \$3,128,035; employees numbered 465 and salaries and wages paid amounted to \$539,143. The cost of fuel, purchased electricity and process supplies used during the year was reported at \$394,357 and the gross value of production totalled \$1,358,922 compared with \$1,188,322 in 1938.

BARYTES

Barytes was mined and shipped by two Canadian operators in 1939. The value of mine shipments totalled \$3,639. The mineral was obtained from a deposit located in Lawson township in the Elk Lake district, Ontario, and from the property of Canada Baryte Mines, Ltd., Langmuir township, Porcupine area, northern Ontario. Shipments from Lawson township represented crude material, while those made by Canada Baryte Mines Ltd., included both crude and milled grades.

Barite production in Canada during past years came largely from deposits in Nova Scotia, Quebec and Ontario and in recent years more particularly from deposits in the Lake Ainslie district, Nova Scotia. Prior to 1939 the last commercial shipments from Canadian deposits were made in 1933 in which year 20 tons valued at \$60 were produced and shipped at the Tionaga mine, Penhorwood township, Ontario. The mineral also occurs in British Columbia. Renewed interest in the deposits of the Lake Ainslie district was exhibited in 1939 and plans were reported for re-opening the old mines.

Ground barite is used as a heavy, white, inert filler in many products, such as paint, paper, rubber, oilcloth, linoleum, plastics, resins, and cloth. It is also used in the manufacture of glass and as a heavy medium in mud in the drilling of deep oil wells where high gas pressures are encountered. The most important single chemical product made from barite is lithopone, an intimate mixture of zinc sulphide and barium sulphate prepared by co-precipitation by double decomposition of solutions of barium sulphide and zinc sulphate; its chief use is as a white pigment.

Germany is the largest world producer of barite and consumption of the mineral in that country has increased during recent years owing to the demand for barite and its derivatives in the manufacture of paints, pigments, ceramics, explosives, rubber goods, etc. The German use of barite in pigments has expanded recently on account of official requirements for mixing barite with red lead in order to extend the supplies of red lead. The United States and Great Britain are also large producers of barite.

Production of barite in Canada from 1885 to 1933, inclusive, totalled 41,027 short tons valued at \$300,610.

Table 279.—Production of Barytes in Canada, 1925-1939

Year	Short tons	\$	Year	Short tons	\$
1925.....	95	2,259	1930.....	66	1,484
1926.....	100	2,307	1931.....	16	363
1927.....	56	1,268	1932.....	20	60
1928.....	127	2,847	1933.....	(a)	3,639
1929.....	105	2,341	1939.....		

(a) Not available for publication.

Table 280.—Barytes and Blanc Fixe Used by the Canadian Paints, Pigments and Varnishes Industry in Canada, 1935-1939

Year	Barytes		Blanc Fixe (*)	
	Pounds	\$	Pounds	\$
1935.....	2,308,628	43,702	141,975	4,223
1936.....	2,533,275	41,687	97,016	3,148
1937.....	2,630,366	42,821	125,743	4,136
1938.....	2,729,212	46,288	116,545	3,287
1939.....	2,884,985	49,659	139,408	4,455

(*) Artificial barium sulphate.

Table 281.—Imports of Blanc Fixe, Lithopone and Barytes into Canada, 1935-1939

Year	Lithopone		Barytes		Blanc Fixe	
	Tons	Value	Pounds	Value	Pounds	Value
1935.....	8,692	\$ 620,615	4,278,400	\$ 33,739	1,139,106	25,759
1936.....	9,429	666,667	3,316,060	26,554	1,064,032	21,480
1937.....	11,081	777,752	74,156,600	32,869	1,068,199	21,162
1938.....	8,866	632,273	(a)4,373,100	38,012	629,258	13,779
1939.....	10,627	765,522	(b)4,350,300	38,607	1,097,959	27,325

† 2,637,700 pounds from Germany, 852,700 pounds from the United States and 492,900 pounds from the United Kingdom.

(a) 325,900 pounds from the United Kingdom, 2,532,800 from Germany, and 1,124,600 from the United States.

(b) 2,784,200 pounds from the United States and 1,215,000 pounds from Germany.

"Metal and Mineral Markets"—New York—quoted barite F.O.B. mines May, 1940—Georgia: barite ore, crude, \$7 per long ton. Missouri: per long ton, water ground and floated, bleached, \$22.85 carlots, F.O.B. works. Crude ore, minimum 95 per cent BaSO_4 , less than 1 per cent iron, \$6.50 to \$7.00; 93 per cent BaSO_4 , \$6.00 to \$6.50 F.O.B. mines.

Table 282.—World Production of Barium Minerals, 1937, 1938 and 1939

(Imperial Institute, London)

(Long tons)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom—				Germany—			
Barytes, unground.....	36,875	47,568		Baden.....	21,311		
Witherite, unground.....	11,882	9,914		Bavaria.....	11,645		
Barytes—				Prussia.....	404,149	470,000	
Ground, bleached.....	5,427	4,011		Saxony.....	425		
Ground, unbleached.....	19,124	14,825		Thuringia.....	6,683		
Southern Rhodesia.....	561	89	49	Wurtemberg.....	189		
Union of South Africa.....		483	432	Greece.....	38,722	34,150	
India.....	15,689	8,075		Italy.....	44,488	47,408	
Australia.....	3,103	2,863		Norway.....	69	(a)	
				Portugal.....	99	22	20
				Egypt.....	50	20	31
				Cuba.....	3,788	(b) 6,065	(b) 11,395
				United States.....	322,212	299,494	326,670
				French Indo-China.....	44	49	
				Japan.....	(a)	(a)	
				Korea.....	(b) 10,872	(b) 15,481	
				Argentina.....			756
FOREIGN COUNTRIES							
Austria.....	841	(a)					
France.....	19,550	27,310					

Barytes is also produced in Czechoslovakia, Spain, U.S.S.R. and China.

(a) Information not available.

(b) Exports.

CORUNDUM

Corundum is found in an area embracing several townships in Renfrew and Hastings counties in the Province of Ontario. Corundum mining as an industry made its appearance there in 1900 and production reached a maximum in 1906. Shipments of the mineral in Canada during the period 1900-1921 totalled 19,524 short tons valued at \$2,104,251. No commercial shipments have been reported since 1921. No imports of corundum into Canada were shown in Customs reports for either 1937 or 1938. United States demand for crude corundum in 1938 was met by the importation of 2,098 tons valued at \$138,629, chiefly from the Union of South Africa. Virtually all corundum and emery is imported into the United States in the crude state and crushed and graded in that country for the domestic market. Production of corundum in the Union of South Africa in 1938 totalled 1,540 short tons valued at £12,454 and the Department of Mines of that country reports that with the depletion of the known eluvial deposits it has become increasingly difficult to maintain supplies of crystal corundum and during 1938 activity on the fields fell off considerably. Negotiations were proceeding with a view to persuading the American market, which absorbs practically all the crystals being produced at present, to take the corundum in the form of concentrates.

Imports into Canada in 1939 of manufactures of emery or of artificial abrasives n.o.p. were valued at \$43,301 of which those appraised at \$40,308 came from the United States. Imports of emery in bulk, crushed or ground were valued at \$55,967 in 1939.

Artificial corundum or "fused alumina" (Al_2O_3) is produced from calcined bauxite in steel-lined, water-cooled furnaces of the arc type. Canadian production of crude fused alumina in 1938 totalled 50,515 short tons valued at \$5,165 920.

DIAMONDS

"Mineral Trade Notes" of the United States Bureau of Mines contained the following information relating to industrial diamonds:—"In the popular mind the diamond is a gem stone, but in 1938 only about one-fourth of the diamonds mined throughout the world were so classed. The other three-fourths were designated industrial diamonds, that is, they were used as tools in industries. Because of its superior hardness, far exceeding that of any other known substance, the diamond is unsurpassed as a cutting agent. For many years the carbonado or black diamond, found in Brazil, was the leading abrasive diamond used for rock drills and for certain other grinding and cutting purposes, but during recent years there has been a decided drift toward wider use of borts, a name applied to diamonds of the gem variety that are unsuitable for ornamental purposes.

"Recently there has been a strong movement toward the use of smaller and smaller diamonds, even to those so small that they are classed as diamond dust. Drill heads are now made by adding as much as 20 per cent diamond dust or small diamonds to powdered metal, and the mixture is then sintered to a solid mass. Small diamonds are also being employed in drill bits of a cast beryllium-copper alloy.

"Another important use for industrial diamonds is in the manufacture of diamond tools for truing abrasive wheels, shaping automobile and airplane engine parts and similar uses. A new use for industrial diamonds is in the manufacture of abrasive wheels, in which small borts or diamond dust are imbedded in tungsten carbide or other powdered metal or in bonded compositions. Other important uses include glass cutting, diamond dies for wire-drawing, diamond-set teeth on circular saws for cutting stone, etc. etc."

Diamond dust or bort and black diamonds for borers imported into Canada in 1939 were valued at \$4,129,532. Imports into Canada of unset diamonds during the same period were appraised at \$1,405,792. It is, however, worthy of note that diamonds imported for abrasive or industrial purposes are often brought in by salesmen and may later, in part, be taken out (unreported) of the country as unsold stock and in such cases the annual value of imports does not represent or reflect a true consumption figure.

Diamonds are not commercially produced or mined in Canada. World production of diamonds in 1938 totalled 11,455,000 carats valued at £7,680,000; of this output the British Empire contributed 3,417,000 carats worth £5,750,000, chiefly from the Union of South Africa, Sierra Leone, South West Africa and the Gold Coast. Among foreign countries the Belgian Congo, Angola and Brazil were the principal producers.

In 1939 the Canadian contract diamond drilling industry drilled 2,063,292 feet of rock and paid \$1,615,615 in salaries and wages to 2,920 employees; income from drilling operations totalled \$3,013,249 and the value of stones and ready set bits purchased amounted to \$607,806. In addition to this the Canadian mining companies completed much drilling with their own equipment and employees.

DIATOMITE

Producers' sales of diatomite in Canada during 1939 totalled 301 short tons valued at \$10,388. Of these 279 tons at \$9,661 came from deposits located near Little River and Tatamagouche, Nova Scotia. Five tons worth \$280 were shipped from the property of Muskoka Diatomite Limited, Muskoka district, Ontario, while in British Columbia the output of 17 tons at \$447 was obtained from deposits on Gabriola Island and in the Cariboo District.

A report issued by the Bureau of Mines, Ottawa, states—"Approximately 80 per cent of the diatomite now being consumed in Canada is in the form of filter-pads, about 15 per cent is used for insulation and the remainder is absorbed as a filler, concrete admixture, silver polish base, and in chemicals. Among the recent applications, the use of diatomite in the paint and varnish industry has demonstrated its advantages as a flattening agent and as an extender. Deposits containing medium quality diatomite are very common in some parts of Canada. Owing, however, to foreign competition and to the, at present, comparatively small Canadian demand only the properly prepared diatomite of the highest quality can now be successfully marketed on a scale sufficiently large to warrant the operations of a property and the erection of a plant. Several

interesting developments took place during 1939. G. Wightman calcined diatomite in a small kiln erected on the Digby Neck deposit, Nova Scotia, and shipped a few tons. A small tonnage of crude diatomite was shipped from the Pocologan area, New Brunswick, to be tested to determine its suitability as a filter pad. The West Coast Silica Products Company erected a mill near the north end of Gabriola Island; the air dried material is calcined in eight small, flat kilns, after which it is pulverized and separated, and a number of different products are bagged."

Table 283.—Production of Diatomite in Canada, 1930-1939

Year	Short tons	\$
1930.....	554	13,247
1931.....	1,610	32,789
1932.....	1,496	29,509
1933.....	1,789	36,648
1934.....	1,372	54,910
1935.....	823	33,140
1936.....	615	13,650
1937.....	643	18,606
1938.....	398	13,842
1939.....	301	10,388

The total Canadian output of diatomite since 1896, when it was first produced in the Dominion, to the end of 1939, totalled 22,028 short tons valued at \$506,698.

Imports into Canada of diatomaceous earth or infusorial earth (Kieselguhr), ground or unground in 1938 totalled 2,565 short tons valued at \$73,900 compared with 4,307 tons at \$128,808 in 1939. Of the 1939 imports, 4,302 tons worth \$128,574 came from the United States.

"Metal and Mineral Markets"—New York—quoted diatomite May, 1940:—per ton, F.O.B. Nevada, dried crude, in bulk, \$7 and in bags \$12; 40 mesh, \$18; 200 mesh \$22.50; low temperature insulation, \$19; high temperature \$40.

Table 284.—Consumption of Infusorial Earth by the Canadian Sugar Refining Industry, 1932-1939

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1932.....	2,577,585	73,309	1936.....	4,375,999	98,954
1933.....	2,507,469	70,191	1937.....	4,586,786	95,532
1934.....	2,562,552	69,116	1938.....	4,908,597	101,473
1935.....	4,307,142	96,560	1939.....	4,819,811	105,711

Table 285.—World's Production of Diatomaceous Earth, 1937, 1938 and 1939

(Supplied by the Imperial Institute)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Great Britain.....	1,141	2,159	.....	Germany (d).....	7,407	(a)	.....
Northern Ireland.....	7,168	5,281	.....	Italy.....	4,586	5,010	.....
Union of South Africa.....	148	153	242	Norway (exports).....	106	48	.....
Canada.....	574	355	269	Portugal.....	109	843	579
Barbados.....	10	10	.....	Roumania (c).....	2,972	2,994	.....
Australia.....	3,190	3,380	.....	Sweden.....	1,736	1,816	.....
FOREIGN COUNTRIES				Algeria.....	12,759	17,800	.....
Bulgaria.....	138	231	.....	United States (b).....	83,228	83,228	.....
Denmark (moler).....	80,000	(a)	.....	Chile.....	340	(a)	.....
Estonia.....	573	1,113	.....	Peru (exports).....	.....	7	.....
Finland.....	1,771	1,574	.....	Japan.....	16,700	21,650	.....
France.....	10,600	(a)	.....	Korea.....	2,480	4,500	.....
				Netherlands East Indies...	39	140	.....

Diatomaceous earth is also produced in Hungary, Spain, and U.S.S.R. and during 1938 there was a small output in New Zealand valued at £70 (N.Z.).

(a) Information not available.

(b) Annual average production 1936-1938.

(c) Converted from cubic metres at the rate of 1 cubic metre=2 long tons.

(d) Production of Hessen only.

FLUORSPAR

Fluorspar production in Canada during 1939 totalled 240 short tons valued at \$4,995 compared with 217 tons at \$3,906 in 1938. Production of the mineral in Canada since 1929 has been confined to the Madoc area, Hastings county, Ontario. Fluorspar was formerly produced at the Rock Candy mine, in British Columbia, by the Consolidated Mining and Smelting Company of Canada, Limited; production in 1929 from this mine totalled 17,800 short tons valued at \$267,000. Following the erection of a large fertilizer plant at Trail, the recovery of by-product fluorine from phosphate rock has obviated the necessity of employing fluorspar as a source of fluorine by the Consolidated Mining and Smelting Company of Canada, Ltd.

Late in 1939, the Moira Fluorspar Mining Syndicate took over the Noyes property, one of the larger of the old producers in the Madoc district; small shipments from the upper levels of the mine were reported and a mill was being built for recovery by jigging, tabling and flotation.

The Department of Public Works and Mines, Nova Scotia, states in its annual report for 1938 that fluorite is associated with barite in veins occurring at East Lake Ainslie, Nova Scotia; a sample from one vein was reported to show a very high fluorite content.

Germany is second only to the United States as a producer of fluorspar, but it has been the chief exporting country. In 1937 according to the United States Bureau of Mines, German production was 144,459 metric tons; and exports were 46,009 metric tons, of which 12,699 metric tons went to the United States.

Shipments of fluorspar from Newfoundland in 1938 were 9,859 short tons, of which 2,539 tons of fluxing grade, 1,116 tons of acid grade, and 1,237 tons of special grade lump (93 to 95 per cent CaF_2) went to Canada. The fluorspar veins in Newfoundland are described as varying in width from 6 inches to 14 feet of solid fluorspar, and in places a width of fluorspar and granite breccia up to 35 feet is to be found.

Under the Anglo-American trade treaty, the duty on fluorspar, containing more than 97 per cent calcium fluoride, was decreased from \$5 a short ton to \$3.75 a ton, effective January 1, 1939.

Quotations May, 1940, for fluorspar, New York, were:—per net ton, 85 per cent CaF_2 , and not over 5 per cent SiO_2 , Kentucky and Illinois, in bulk F.O.B. mines, washed gravel \$20 for all rail movement; \$20 for barge movement, No. 2 lump \$21 F.O.B. mines.

Ground fluorspar, F.O.B. Illinois mines, 95 to 98 per cent CaF_2 and not over $2\frac{1}{2}$ per cent SiO_2 , \$31 in bulk. Foreign fluorspar, gravel, 85.5 \$25.50 per ton, duty paid, Baltimore or Philadelphia.

Table 286.—Production of Fluorspar in Canada, 1930-1939

Year	Short tons	\$
1930.....	80	1,240
1931.....	40	620
1932.....	32	464
1933.....	73	1,064
1934.....	150	2,100
1935.....	75	900
1936.....	75	900
1937.....	150	2,550
1938.....	217	3,906
1939.....	240	4,995

Table 287.—Imports of Fluorspar into Canada, 1935-1939

Year	Tons	\$
1935.....	11,591	92,775
1936.....	11,194	95,268
1937.....	11,444	168,082
1938.....	†15,057	212,131
1939.....	16,322	258,796

† 6,092 tons at \$87,874 from Newfoundland and 5,005 tons at \$50,421 from France in 1938 and 5,640 tons at \$82,805 from Newfoundland and 6,502 tons at \$130,885 from the United States in 1939.

Table 288.—Consumption of Fluorspar in Canada, by Uses, as Reported to the Annual Census of Industry, 1938 and 1939

Industries	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
Steel furnaces.....	7,128	119,301	7,972	122,778
Chemicals (acids, alkalies and salts).....	4,652	107,614	6,395	154,446
Glass.....	112	4,507	131	5,330
Ferro-alloys.....			4	80
Enamelling and glazing.....	120	(a)	182	(a)
Total accounted for.....	12,012		14,684	

(a) Not available.

According to the United States Bureau of Mines the quantity of fluorspar used by individual plants per ton of basic open-hearth steel produced ranges from 1 to 50 pounds. The steel industry is the chief consumer of fluorspar followed in order by hydrofluoric acid, glass and enamel industries; smaller quantities are used in the production of iron castings, nickel and monel metal, cement, ferro-alloys, etc., also in smelting refractory ores of gold, silver and copper.

Table 289.—World Production of Fluorspar, 1937, 1938 and 1939

(Imperial Institute, London)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	42,160	33,331		Germany—Con.			
Southern Rhodesia.....		154		Bavaria.....	61,469	58,973	
South West Africa.....		576	104	Prussia.....	30,032	22,593	
Union of South Africa.....	3,558	4,661	10,159	Saxony.....	7,946	11,872	
Canada.....	134	194	214	Thuringia.....	15,862	22,051	
Australia.....	1,442	3,231		Italy.....	13,174	11,994	
Newfoundland.....	12,000	14,000		Norway.....	1,665	(a)	
FOREIGN COUNTRIES				U.S.S.R.....	(a)		
France.....	50,650	51,100		Tunis.....	1,676	2,011	
Germany—				Mexico (estimated).....	1,000	1,000	1,300
Anhalt.....	13,446	10,297		United States.....	163,000	88,000	154,000
Baden.....	13,422	21,013		Argentina.....	344	1,384	727
				Korea.....	(b) 9,532	(b) 33,667	

Fluorspar is also produced in Spain and China.

(a) Information not available.

(b) Exports.

GARNETS

No commercial production of garnets has been reported in Canada for several years. In 1938 prospecting and exploratory work were conducted by Garnet Concentrates Inc., on a garnet deposit located in Beaudin township, Abitibi district, Quebec. The total recorded production of garnets in Canada during past years was 1,612 tons valued at \$107,350 and was confined to the years 1923, 1924 and 1927. In 1923 a deposit of garnets in Ashby township, Ontario, was operated by the Bancroft mines syndicate; the total production of garnet concentrates and crude garnets amounting to 1,250 tons valued at \$100,000 was shipped to the Carborundum Company Limited, Niagara Falls, N.Y., for use as an abrasive material; the production of garnets in 1924, amounting to 360 tons, valued at \$7,200 also originated in Ontario and was shipped to the same company at Niagara Falls, N.Y. In 1927 development work was conducted on a garnet deposit in Joly township, Labelle county, Quebec and a shipment of 2 tons was made. Grenat Canada Limited reported that considerable construction work was carried out at its property in Joly township, Labelle County, Quebec, during 1939. Machinery was installed but no garnet shipments reported.

Garnet is employed chiefly in the manufacture of abrasive papers and cloths while small amounts are utilized in the grinding of plate glass and other products.

No imports of garnet, described as such, were recorded in Canada during 1938 or 1939; the mineral, however, may enter in the form of abrasive paper or combined with other abrasive imports, n.o.p. It has been reported that approximately 175 tons of graded garnet grains are imported annually into Canada. In 1938 the Canadian artificial abrasives industry used 98 short tons of garnets valued at \$17,219 compared with 164 tons at \$28,951 in 1937.

Imports of sandpaper during 1913 were valued at \$171,516 compared with \$331,776 in 1917 and \$317,048 in 1918. Imports in 1939 of sandpaper and emery cloth were appraised at \$60,797.

Engineering and Mining Journal's "Metal and Mineral Markets"—New York—October, 1939, quotations for garnet were—per ton, f.o.b. New Hampshire mines; concentrate, \$30; grain, \$80 to \$140. New York: Adirondack garnet concentrates, \$85. Spanish grades, \$60, c.i.f. port of entry. Nominal.

GRAPHITE

Canadian mine production of graphite during 1939 was valued at \$61,684 compared with \$41,590 in 1938. The output in 1939, as in the preceding year, came solely from the Black Donald mine, Renfrew county, Ontario. Relatively small and intermittent shipments of graphite were also made from Quebec properties prior to 1935. No ore was mined at the Black Donald mine in 1939 and milling operations during the year represented the retreatment of some 2,700 tons of tailings. The mill was in operation from June 5 to December 23 and finished products included flake, dust and amorphous grades. Flotation is employed in the treatment of Black Donald ore.

A half dozen or more countries are fairly large graphite producers but, according to the United States Bureau of Mines, none in recent years has challenged the supremacy of Ceylon and Madagascar as producers of high grade graphite; although the tonnage mined in Ceylon and Madagascar seldom exceeds 15 per cent of the world total, the value of their products is probably at least half the world total.

"Metal and Mineral Markets"—New York—quoted graphite October 1939 as follows: per pound f.o.b. New York, Ceylon lump, 7 to 7½ cents; carbon lump 6 to 6½ cents; chip, 5¼ to 5¾ cents; dust 3 to 4 cents; Madagascar flake 6 to 8 cents; no. 1 flake, 9 to 16 cents; no. 2, 7 cents upwards; fine ground, 55 to 70 per cent carbon, 3 cents upward; amorphous, 3 cents upward. Crude amorphous graphite, f.o.b. New York \$12 to \$23 per ton, according to grade.

Table 290.—Mine Production (Sales) of Graphite in Canada, 1930-1939

Year	Short tons	\$
1930.....	1,535	96,392
1931.....	548	32,149
1932.....	346	18,483
1933.....	405	18,367
1934.....	1,518	71,424
1935.....	1,782	79,781
1936.....	(a)	88,812
1937.....	(a)	125,343
1938.....	(a)	41,590
1939.....	(a)	61,684

The value of mine graphite produced in Canada from 1886 to the end of 1938 totalled \$3,606,925.
(a) Not published.

Table 291.—Production of Graphite in Canada, by Provinces, 1930-1939

Year	Quebec		Ontario		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
1930.....	197	9,850	1,338	86,542	1,535	96,392
1931.....			548	32,149	548	32,149
1932.....			346	18,483	346	18,483
1933.....	43	2,222	362	16,145	405	18,367
1934.....	129	6,426	1,389	64,998	1,518	71,424
1935.....	21	1,281	1,761	78,500	1,782	79,781
1936.....				88,812		88,812
1937.....				125,343		125,343
1938.....				41,590		41,590
1939.....				61,684		61,684

Table 292.—Canadian Imports and Exports of Graphite, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
IMPORTS—				
Crucibles, plumbago.....		60,616		60,091
Plumbago, not ground or otherwise manufactured.....		18,546		18,384
Plumbago, ground, and manufactures of, n.o.p.....		69,342		86,944
EXPORTS—				
Graphite or plumbago, crude or refined.....	1,150	54,366	1,321	56,614
Carbon and graphite electrodes.....		614,925		762,334

Table 293.—Consumption of Graphite or Plumbago in Canada, by Industries, as Reported to the Census of Industry, 1938 and 1939

Industry	1938		1939	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
Paints and varnishes.....	47	4,057	48	4,164
Polishes.....	46	5,231	39	4,667
Foundries.....	134	15,789	208	21,706
Acids and salts (*).....	75	21,890	23	6,815
Prepared foundry facings.....	177	8,887		4,653
Total accounted for.....	479	55,354		42,005

Table 294.—World Production of Graphite, 1937, 1938 and 1939

(Imperial Institute, London)

(Long tons)

Producing Country	1937	1938	1939	Producing Country	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Union of South Africa.....	61	53	58	Norway (exports).....	3,684	3,781	
Canada (sales).....	(b)	(b)		Sweden.....	25	47	
Ceylon (exports).....	17,381	11,783	22,396	Madagascar—			
India.....	558	458		Flake.....	7,877	10,305	
Australia.....	14	10		Powder.....	2,583	4,011	
FOREIGN COUNTRIES				Morocco (French).....	331	193	
Austria (crude).....	17,871	16,586		Argentina.....	25	28	
Czechoslovakia.....	5,063	(a)		Mexico.....	11,032	9,459	9,660
Germany (crude).....	23,172	27,662		Brazil.....	8	(a)	3
Italy.....	5,326	5,396		Japan.....	(a)	(a)	
				Korea—			
				Flake.....	(c) 5,182	(c) 7,742	(c) 56,354
				Other.....	(c) 37,698	(c) 41,811	

NOTE.—Graphite is also produced in the U.S.S.R. and the United States.

(a) Information not available.

(b) Recorded by value only	1937.....	£25,373
	1938.....	£ 8,440
	1939.....	£13,350

(c) Exports.

GRINDSTONES AND PULPSTONES

Quarry sales of grindstones and other natural abrasive stones (sandstone) in Canada during 1939 totalled 304 short tons valued at \$15,278 compared with 306 tons worth \$16,198 in 1938. The shipments in 1939 comprised 20 tons of sharpening stones valued at \$3,088 and 284 tons of grindstones worth \$12,190. No pulpstones were produced during the year under review and the sharpening stones came entirely from a plant in New Brunswick. The output of grindstones in 1939 originated at the Woodburn quarry, Pictou county, Nova Scotia, and at Stonehaven, New Brunswick.

The Department of Mines, Nova Scotia, describes the products of the Woodburn quarry of the Stanley Rule and Level Company as yellow and blue fine grained sandstones, the former being used for grindstones, while the latter is suitable for scythestones and whetstones. The sandstone bed is 25 to 30 feet thick. The rough blocks are quarried by the usual method of drilling and wedging. The blocks are then cut to rough dimensions by hand and holes drilled in the centre. These are then placed in lathes and turned to the required dimensions. The finished stones vary in size from 1 to 6 feet in diameter and from 2 to 10 inches in thickness. The quarry is capable of furnishing grindstones 24 inches in width if desired.

The Bureau of Mines, Ottawa, reported in 1938 that there was a demand for good pulpstones, particularly for use in the large magazine grinders, but as deposits containing thick beds of the proper quality sandstone are very scarce in Canada, only about 1 per cent of the stones used recently in Canadian pulpmills was produced in the Dominion. The artificial pulpstones made of silicon carbide segments and also more recently of fused alumina segments are gradually but surely replacing the natural stone.

Imports of grindstones, etc., into Canada in 1939 were as follows:—Grinding wheels, manufactured by the bonding together of either natural or artificial abrasives, value \$100,977 (\$98,881 from United States); Grinding stones or blocks, manufactured by the bonding together of either natural or artificial abrasives, value \$22,586 (\$19,711 from United States); Grindstones not mounted and not less than 36 inches in diameter number 849 value \$126,260 (152 at \$3,066 from United Kingdom and 697 at \$123,194 from United States); Grindstones n.o.p. number 1,502 value \$7,013.

Exports of manufactured grindstones from Canada in 1939 were valued at \$6,312.

Table 295.—Production of Grindstones, Pulpstones and Scythestones in Canada, 1930-1939

Year	Tons	\$
1930.....	830	62,021
1931.....	621	38,103
1932.....	328	15,735
1933.....	498	21,919
1934.....	987	46,478
1935.....	708	34,010
1936.....	569	24,724
1937.....	412	21,429
1938.....	306	16,198
1939.....	304	15,278

Table 296.—Production of Natural Abrasive Stones, by Kinds, 1939

	Pulpstones		Sharpening Stones		Grindstones	
	Tons	\$	Tons	\$	Tons	\$
Nova Scotia.....					152	5,616
New Brunswick.....			20	3,088	132	6,574
British Columbia.....						
Canada.....			20	3,088	284	12,190

Table 297.—Consumption of Pulpstones by the Canadian Pulp and Paper Industry, 1931-1939

Year	Number for 2 ft. wood	Value \$	Number for 2-5 ft. wood	Value \$	Number for 4 ft. wood	Value \$
1931.....	226	72,588	225	71,760	285	337,580
1932.....	210	65,450	139	46,436	222	249,373
1933.....	321	98,475	95	31,945	199	223,635
1934.....	378	103,811	84	29,680	268	292,359
1935.....	417	116,501	52	20,297	237	243,805
1936.....	463	120,227	61	19,478	253	281,265
1937.....	392	123,598	84	21,700	280	382,084
1938.....	306	92,822	37	13,351	186	238,488
1939.....	242	60,622	60	22,443	203	238,620

The Artificial Abrasives and Abrasive Products Industry

The factory selling value of all products made during 1939 by the manufacturers in Canada of artificial abrasives and abrasive products amounted to \$9,275,143. This value represented a decline of 3 per cent from the total of \$9,579,705 in 1938 and 34 per cent from the 1937 output of \$14,174,351.

There was no change in the number or location of the establishments which made artificial abrasives and abrasive products in 1939, there being fourteen works in Ontario and two in Quebec. The average number of employees in the industry was 1,099 and payments in salaries and wages totalled \$1,630,889. Expenditures for manufacturing materials amounted to \$2,971,056 and \$777,654 was paid out for fuel and electricity. Capital investment in the industry totalled \$7,179,801, of which \$3,259,831 was the value placed on land and buildings.

Artificial abrasives were made in 4 plants in Ontario and 2 in Quebec. The output of these 6 works was valued at \$7,191,098 and included 51,118 tons of crude fused alumina at \$4,565,569; 17,225 tons of crude silicon carbide at \$1,865,604 and other products and by-products, such as, ferrosilicon, firesand, refractory brick, refractory cements, calcium boride, crude boron carbide and boron carbide shapes. An average of 784 people were employed and salaries and wages totalled \$1,123,226.

Ten other plants were occupied chiefly in making abrasive products, such as, wheels, paper, pulpstones and sharpening stones; 9 made abrasive wheels and segments, 7 made sharpening stones and files, and 2 made abrasive cloth and paper. The value of all products made in these establishments was \$2,084,045, of which \$1,117,689 was for abrasive wheels and segments. The number of employees was 315 and payments for salaries and wages amounted to \$507,663.

Exports of crude artificial abrasives totalled 71,956 tons valued at \$4,380,148 in 1939, and the exports of wheels and stones were reported at \$47,158.

Imports of crushed or ground artificial grains were appraised at \$642,792 and manufactured grinding wheels at \$100,977 in 1939.

Table 298.—Products Manufactured, 1938 and 1939

Product	1938		1939	
	Short tons	Selling value at works	Short tons	Selling value at works
		\$		\$
Crude silicon carbide.....	19,094	2,002,041	17,225	1,865,604
Crude fused alumina.....	50,515	5,165,920	51,118	4,565,569
Silicon carbide firesand, etc.....	321	5,147	416	10,034
Abrasive wheels and segments.....		916,695		1,117,689
Sharpening stones and files.....		91,467		96,217
Ferrosilicon.....	6,819	79,369	5,693	65,533
Other products*.....		1,319,066		1,554,497
Total.....		9,579,705		9,275,143

* Includes abrasive cloth, abrasive paper, tiles, artificial pulpstones, artificial graphite, boron carbide, boron carbide shapes, calcium boride, fused magnesia, refractory cements, firebrick, etc., each of which was reported by only one or two companies.

Table 299.—Materials Used in Manufacturing, 1938 and 1939

Material	Unit of measure	1938		1939	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Bauxite and pure alumina.....	short ton	57,120	1,267,712	60,441	1,440,406
Coal (not for fuel)—					
For fused alumina.....	short ton	308	1,603	244	1,398
For silicon carbide.....	short ton	5,855	35,241	5,029	31,442
Coke (not for fuel)—					
For fused alumina.....	short ton	3,723	20,391	3,685	21,496
For silicon carbide.....	short ton	17,647	230,963	18,123	217,434
Electrodes.....	short ton	929	111,746	986	119,845
Feldspar.....	short ton	41	1,129	45	1,368
Iron borings.....	short ton	5,651	51,155	5,993	47,996
Salt.....	short ton	203	1,784	200	2,265
Sawdust.....	short ton	7,132	19,242	6,155	16,149
Silica sand.....	short ton	32,746	159,284	32,661	161,514
Artificial abrasive grains.....	short ton	2,534	281,475	2,996	370,482
Natural abrasive grains—					
Garnet.....	lb.	195,536	17,219	310,213	25,737
Emery.....	lb.	66,191	3,807	91,721	5,254
Quartz or flint.....	lb.	405,282	4,937	253,099	4,828
Other.....	lb.	22,195	2,805	56,958	4,967
Bonding and bushing materials—					
Clay bonds.....	lb.	436,380	13,015	611,069	16,890
Silicate (quantity in equivalent solid form).....	lb.	6,781	340	10,898	426
Elastic mixture.....	lb.	15,150	3,654	17,227	4,493
Bakelite and synthetic resins.....	lb.	108,591	37,426	80,387	34,119
Lead and bushings.....	lb.	35,150	1,814	36,380	1,811
Cotton cloth.....			71,390		45,166
Kraft and rope paper.....			61,543		93,495
Containers and packing material.....			29,555		34,378
All other material.....			228,163		267,697
Total.....			2,657,393		2,971,056

Table 300.—Imports into Canada and Exports of Abrasives, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
		\$		\$
IMPORTS				
Artificial abrasive grains, crushed or ground for use in Canadian manufactures.....		418,462		642,792
Diamond dust or bort and black diamond for borers.....		3,950,695		4,129,532
Diatomaceous earth or infusorial earth (Kieselguhr), ground or unground.....	51,299 Cwt.	73,900	86,139	128,808
Emery in bulk, crushed or ground.....		38,743		55,967
Grinding wheels, manufactured by the bonding together of either natural or artificial abrasives.....		88,851		100,977
Grinding stones or blocks, manufactured by the bonding together of either natural or artificial abrasives.....		21,257		22,586
Manufactures of emery or of artificial abrasives, not otherwise provided for.....		42,345		43,301
Grindstones, not mounted, and not less than 36 inches in diameter.....	840	91,205	849	126,260
Grindstones, not otherwise provided for.....	No. 4,516	6,161	1,502	7,013
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		24,688		29,314
Sand paper, glass, flint and emery paper and emery cloth.....		60,560		60,797
Total.....		4,816,870		5,347,347
EXPORTS				
Abrasives, natural, not otherwise provided for, in ore or bulk, crushed or ground, including infusorial earth, rotten stone, tripoli, etc....	6,397 Cwt.	11,346	5,122	11,827
Abrasives, artificial, crude, including carborundum.....	1,202,216 Cwt.	3,773,570	1,439,126	4,380,148
Abrasives, artificial, made up into wheels, stones, etc. (To March 31, 1938).....		47,704		
Abrasives, artificial, made up into wheels and stones (From April 1, 1938).....		32,219		47,158
Sandpaper, glass, flint and emery paper, and emery cloth (From April 1, 1938).....		79,600		122,296
Grindstones, manufactured.....		5,441		6,312
Total.....		3,949,880		4,567,741

KYANITE

The following information is from a recent bulletin of the "Imperial Institute", London (Vol. XXXVI—No. 4). Kyanite, a natural silicate of alumina (Al_2SiO_5 or $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$) is finding a steadily growing market for the preparation of refractories. It is not used in the raw state, but is first fired at $1,450^\circ$ to $1,500^\circ \text{C.}$, and then ground ready to mix with the bond. The product of calcination, however, is known in the trade as "Sillimanite", a misnomer which often leads to confusion. Sillimanite and andalusite are other natural minerals of exactly the same chemical composition as Kyanite (but different in physical properties), and both are likewise converted on heating into mullite and silica. The conversion of andalusite into mullite is not accompanied by any change in volume and this mineral can, therefore, be used in the raw state as a refractory. Mullite made from Kyanite is used in the construction of numerous types of furnaces, including electric furnaces and those for the enamelling and glass industries. When added to ceramic compositions containing clay and kaolin, it is claimed to reduce shrinkage, lower the coefficient of expansion, increase breaking strength, resistance to abrasion and electrical resistance, and extend the sintering range. It is also a constituent of certain spark-plug porcelains.

Kyanite is usually a rock-forming mineral, and only rarely does it occur in large monomineralic masses as segregations in quartz-kyanite gneiss or schist. Indian kyanite is the most popular at the present time, the production in India commenced in 1924 and amounted to 24,787 tons in 1936. The mineral also occurs in Nyasaland, British East Africa and Western Australia.

The leading andalusite mine in the world is operated by Champion Sillimanite, Inc., in the White Mountains, California; this company is a subsidiary of the Champion Spark Plug Co., Detroit, Mich. Imports of kyanite and sillimanite into the United States in 1938 totalled 3,964 short tons valued at \$32,458 compared with 7,674 short tons at \$79,410 in 1937.

None of the minerals, kyanite, sillimanite or andalusite are commercially mined in Canada at the present time and any imports of these minerals into Canada are not shown separately in the Canadian Customs classification. "Metal and mineral markets"—New York, October 1939 quoted kyanite—per ton f.o.b. North Carolina and Georgia \$17.50 to \$25 nominal.

LITHIUM MINERALS

Commercial production of Canadian lithium minerals was first recorded in 1937. These were made by the Lithium Corporation of Canada, Limited, from deposits located at Bernic Lake, near Pointe de Bois, Eastern Manitoba. The material was valued at \$1,694 and was consigned to a United States chemical plant. The Bureau of Mines, Ottawa, reports that the present supply of lithium minerals is drawn from deposits in the United States, Southwest Africa, and France. The newly discovered spodumene deposits in North Carolina are regarded as one of the world's largest potential sources of supply of lithium. The principal commercial lithium ores are amblygonite, a fluophosphate of lithium and aluminium; spodumene, a silicate of these two elements; and lepidolite or lithia mica, also a silicate. All of the above minerals occur in Canada, but there has, as yet, been only a small production, mainly of lepidolite and spodumene; the important deposits are all in Manitoba. No commercial mine shipments of lithium minerals were reported in Canada during 1939, however, the Lithium Corporation of Canada Limited reported that operations were resumed at its Bernic Lake property in December 1939 and that commercial shipments of lithium minerals might be made from the mine in 1940.

South West Africa and France are the largest producers of lithium ores outside the United States. In 1938 the total production of lithium compounds in the United States as given by producers to the United States Bureau of Mines, aggregated 892 short tons valued at \$47,088 and in 1939 production totalled 1,990 short tons valued at \$97,000.

Spodumene expands in whiteware bodies, and if properly controlled this expansion may offset shrinkage and other production troubles in ceramic work. Lepidolite hardens and toughens clear glass and lowers the expansion coefficient.

"Metal and Mineral Markets" New York quoted lepidolite (Oct. 1939), per ton, \$20 to \$25 for ordinary grades, lump f.o.b. mines. Amblygonite—per ton f.o.b. mines 8 to 9 per cent LiO_2 \$40. Spodumene—per unit LiO_2 contained \$5 on 6 per cent grade carload lots, North Carolina.

Statistics relating to possible imports of lithium minerals or chemicals into Canada are not shown separately in the Canadian Customs classification.

MAGNESITIC-DOLOMITE

Production of magnesitic-dolomite (sales and producers' consumption of calcined and dead burned) in Canada during 1939 was valued at \$474,418.

Magnesitic dolomite, an intimate mixture of magnesite and dolomite, is quarried and processed at Kilmar and Harrington East, in Argenteuil county, Quebec. It is marketed in the caustic and dead-burned states; in the form of bricks; as finely ground refractory cement; and also in combination with chrome as an ingredient in certain types of refractories. Caustic-calcined magnesia is used for fettling the bottoms of basic open hearth furnaces and for the construction of floors and floor tiles. The deposits of magnesitic dolomite in Argenteuil county, Quebec, are ample to supply magnesia products for domestic requirements for many years, and also to support a large export trade. An interesting and recent development was the discovery by one of the officers of the Federal Bureau of Mines, at Rutherglen, Ontario and at Bryson, Quebec, of brucite-bearing limestones. Brucite, a hydrated magnesium oxide contains a higher percentage of magnesium than magnesite and can be utilized for the manufacture of refractory material for lining metallurgical furnaces. It has value as a potential source of magnesium metal. The mineral also occurs at Farm Point in the Gatineau River Valley, Quebec. The brucite occurs as granules thickly disseminated through a matrix of crystalline limestone and by a process developed in the Bureau of Mines laboratories it is possible to recover these brucite granules in the form of magnesia of a high degree of purity.

Large deposits of magnesite, containing much silica and alumina, occur in British Columbia near Marysville and have been acquired by Consolidated Mining & Smelting Company of Canada, Limited; no commercial production from these deposits has yet been reported.

The United States Bureau of Mines reported on brucite in its 1939 minerals Year Book as follows:—"After sundry set-backs, brucite has just become established on a moderately extensive scale. The deposits near Luning, Nevada, are of enormous extent and high purity. Small quantities of this natural hydrate of magnesia $Mg(OH)_2$, have been employed in petroleum refineries and for making magnesium compounds but the important outlet at present is in the manufacture of furnace refractories, largely to increase the slag resistance of dolomite." The extraction of magnesia from sea water has now reached the commercial stage in the State of California and in England.

Table 301.—Production of Magnesitic-Dolomite (Calcined) in Canada, 1930-1939

Year	Tons	Value
1930.....		\$
1931.....	13,336	336,162
1932.....	11,411	295,579
1933.....	(a)	262,860
1934.....	(a)	360,128
1935.....	(a)	382,927
1936.....	(a)	486,084
1937.....	(a)	768,742
1938.....	(a)	677,207
1939.....	(a)	420,261
	(a)	474,418

† Represents value of magnesite (dead-burned, etc.) only, whereas the values for years immediately preceding include the value of some end products containing imported material; for this reason the 1938 and 1939 values are not entirely comparable with those for preceding years.

(a) Not published.

Table 302.—Magnesite and Dolomite Used in the Canadian Primary Iron and Steel Industry, 1931-1939

	Dolomite		Magnesite	
	Short tons	Value	Short tons	Value
1931.....		\$		\$
1932.....	15,773	76,317	(a)	(a)
1933.....	6,725	32,523	420	14,500
1934.....	6,874	30,557	399	14,798
1935.....	14,748	69,104	2,733	105,072
1936.....	18,394	79,914	3,891	149,987
1937.....	43,562	145,502	6,432	230,656
1938.....	53,066	181,146	8,994	326,091
1939.....	40,540	137,127	9,219	336,811
	40,592	78,904	11,401	351,680

(a) Information not available.

Relatively large quantities of magnesite or magnesium refractories are also used in the smelting of non-ferrous ores but complete data relating to this consumption are not yet available.

Table 303.—Calcined Magnesite Used by the Artificial Abrasive and Abrasive Products Industry in Canada, 1933-1939

Year	Tons	Value	Year	Tons	Value
		\$			\$
1933.....	(a)	16,430	1937.....	484	29,242
1934.....	104	6,370	1938.....		
1935.....	40	2,448	1939.....	121	7,735
1936.....	418	25,256			

(a) Information not available.

Table 304.—Imports and Exports of Magnesite and Products, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
IMPORTS—				
Magnesia pipe covering.....		34,601		47,276
Magnesite (crude rock).....	0.05	4	31	640
Magnesite firebrick.....		571,910		677,011
Magnesite, dead-burned, sintered, caustic-calcined or plastic magnesia.....	698	43,956	596	37,366
Magnesium carbonate, excepting crude rock and that used for rubber manufacture.....	382	35,575	518	51,864
Magnesia (magnesium oxide).....	70	17,108	135	32,030
Magnesite calcined, for the manufacture of insulating materials (a)...	299	9,307	433	16,745
EXPORTS—				
Magnesite, calcined or dead-burned.....	3,971	95,607	7,399	183,034

(a) This item recorded only from April, 1937.

"Metal and Mineral Markets" New York, October, 1939 quotations for magnesite were:— per ton f.o.b. California, dead burned, \$25. Artificial periclase, 94 per cent, MgO, \$65; 90 per cent \$35. Caustic 95 per cent MgO, white color, \$40; 85 per cent MgO, no colour standard \$37.50. Washington: Dead-burned grain magnesite, \$22.

Table 305.—World Production of Magnesite, 1937-1939

(Imperial Institute, London)

(Long tons)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
Union of South Africa—				Greece—			
Crude.....	1,724	2,574	3,959	Crude.....	159,123	165,586	
Canada—Crude.....	(d)	(d)	(d)	Caustic (c).....	44,548	36,474	
India—Crude.....	26,166	25,611		Dead-burnt (c).....	5,404	3,254	
Australia—Crude.....	19,705	19,516		Italy—			
				Crude.....	5,307	6,060	
FOREIGN COUNTRIES				Calcined (c).....		650	
Austria—				Norway—			
Crude.....	451,980	(a)		Crude.....	2,063	(a)	
Caustic (c).....	(a)	(a)		Calcined (c).....	601	(a)	
Dead-burnt (c).....	(a)	(a)		Bricks (c).....	587	(a)	
Bricks (c).....	(a)	(a)		Yugoslavia (Serbia only)—			
Czechoslovakia—				Crude.....	40,531	38,693	32,366
Crude (b).....	12,010	12,789		Calcined.....	19,464	15,146	13,442
Calcined (b).....	37,465	28,923		United States—			
Bricks (b).....	3,256	902		Crude.....	181,640	86,600	177,661
Germany (Prussia)—				Caustic (sales) (c).....	8,956	6,607	9,069
Crude.....	20,758	(a)		Dead-burnt (sales) (c)...	74,289	34,588	76,854
				Korea—Crude.....	(e) 14,188	(e) 15,820	
				Manchuria—Crude.....	(e) 163,797	(e) 168,996	
				Turkey—			
				Crude.....	316	850	428
				Calcined.....			57

(a) Information not available.

(b) Exports less imports.

(c) Derived from crude shown, and not additional.

(d) Production recorded by value only:—1936.... £154,583

1937.... £137,086 1938.... £85,280 1939.... £103,000

(e) Exports.

For 1937 the values represent the calcined magnesite sold plus the value of manufactured products, whereas the 1938 figure represents the value of the calcined magnesite sold plus the value of the magnesite used for further manufacture.

Magnesite is also produced in the U.S.S.R.

MAGNESIUM SULPHATE (EPSOM SALTS—NATURAL)

Production (sales) of natural magnesium sulphate or crude epsom salts in Canada during 1939 totalled 550 short tons valued at \$9,900 compared with 470 short tons worth \$9,400 in 1938. Production during the year under review represents refined material shipped from the plant of Epsom Refineries Limited located at Ashcroft, British Columbia. The refinery operated until May 31 and treated crude salts obtained from the Basque deposits located in the Kamloops Mining Division. No mining operations were conducted in 1939. The properties of Epsom Refineries Limited were purchased in 1939 by Winnipeg interests and the refinery was later dismantled. It was suggested by the new owners that if operations were resumed a new refinery might be constructed at the deposits in order to reduce the haulage costs on raw material.

The stoppage of imports of magnesium sulphate owing to war conditions and the appreciable rise in price of the high grade material offers a good opportunity for the western Canadian deposits again to become steady producers.

In 1918 crude magnesium sulphate was mined at Spotted Lake in the Osoyoos division, British Columbia, the crude material was refined at Oroville, Wash., U.S.A.; shipments in 1916 were reported at 250 tons and in 1915 about 300 tons; the same operator also made shipments during 1918 from a deposit near Clinton, in Lillooet, British Columbia.

Table 306.—Production of Natural Magnesium Sulphate in Canada*, 1935-1939

Year	Tons	Value
1935.....		\$
1936.....	340	7,965
1937.....	654	13,712
1938.....	727	14,458
1939.....	470	9,400
	550	9,900

(*) Produced entirely in British Columbia.

Table 307.—Magnesium Sulphate Used in Canadian Pharmaceutical Preparations and in Tanning, 1935-1939

Year	Pharmaceutical preparations		Tanning	
	Pounds	Value	Pounds	Value
1935.....		\$		\$
1936.....	826,082	22,647	759,744	12,254
1937.....	878,120	23,162	1,115,965	15,120
1938.....	919,825	23,881	992,203	16,165
1939.....	855,547	23,687	1,272,549	14,153
	830,927	24,091	1,139,670	17,808

Table 308.—Imports Into Canada of Magnesium Sulphate (Epsom Salts), 1931-1939

Year	Pounds	\$	Year	Pounds	\$
1931.....	4,120,086	43,807	1936.....	3,579,069	37,923
1932.....	4,383,115	47,679	1937.....	(*) 3,355,147	33,116
1933.....	4,269,852	49,868	1938.....	(a) 3,606,167	33,018
1934.....	4,599,518	48,459	1939.....	(b) 3,901,383	56,648
1935.....	3,684,390	40,407			

(*) 2,553,069 pounds valued at \$17,030 from Germany and 693,204 pounds at \$14,058 from the United States.

(a) 2,883,622 pounds valued at \$18,659 from Germany and 604,205 pounds valued at \$12,312 from the United States.

(b) 1,375,626 pounds at \$9,901 from Germany and 2,353,269 pounds at \$43,513 from the United States.

Canadian trade publications quoted (September, 1939) magnesium sulphate, B.P. bbls. 2½ to 3 cents per pound. Technical, bags, \$35 to \$40 per ton.

MINERAL WATERS

Shipments of natural mineral waters from Canadian springs totalled 123,769 imperial gallons valued at \$19,105 in 1939 compared with 188,309 imperial gallons worth \$21,619 in the preceding year. Production during both years originated in Ontario and Quebec. Some of the more prominent Canadian mineral waters possessing special therapeutic or hygienic properties include the following: in Quebec, the Abenakis springs on the St. François river in Yamaska county; Potton Springs in Brome county and the Coulombia spring at L'Epiphanie. In Ontario, saline, sulphur and gas springs occur at Caledonia Springs and at Carlsbad Springs, near Ottawa; the waters range from alkaline to strongly saline. St. Catharines, near Niagara, is one of the oldest Canadian mineral water resorts and sulphur waters are found at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta. In British Columbia the Harrison Hot Springs in the Fraser Valley and the Halcyon Hot Springs on Arrow Lake are noted for their curative properties.

The total number of firms reporting production of natural mineral waters in the Dominion totalled 13 in 1939, of which 10 were located in the province of Quebec and 3 in Ontario.

It is interesting to note that natural mineral waters from springs in the county of Lac St. Jean, Quebec, were utilized during both 1936 and 1937 in highway maintenance.

Table 309.—Shipments of Natural Mineral Waters from Canadian Springs, 1935-1939

	Quebec		Ontario		Canada	
	Imp. gal.	\$	Imp. gal.	\$	Imp. gal.	\$
1935.....	126,616	15,113	19,900	1,477	146,516	16,590
1936.....	131,186	17,399	23,100	1,117	154,286	18,516
1937.....	198,319	19,697	26,700	889	225,019	20,586
1938.....	159,893	19,033	28,416	2,586	188,309	21,619
1939.....	104,629	17,503	19,140	1,602	123,769	19,105

Imports into Canada of natural mineral waters, not in bottles, totalled 60 imperial gallons valued at \$23 in 1939 compared with 90 gallons worth \$20 in 1938. Mineral and aerated waters, n.o.p., imported during 1939 were valued at \$69,525 against \$61,928 in the preceding year.

Exports of mineral and aerated waters during 1939 were valued at \$1,842 while in 1938 similar exports amounted to \$6,177.

Table 310.—Sales of Natural Mineral Waters* by the Canadian Aerated Waters Industry, 1930-1939

Year	\$	Years	\$
1930.....	178,348	1935.....	45,100
1931.....	140,730	1936.....	63,687
1932.....	92,069	1937.....	102,648
1933.....	77,125	1938.....	105,872
1934.....	52,113	1939.....	95,531

(*) Whether fortified or not.

PHOSPHATE

Production of phosphate in 1939 amounted to only 157 tons valued at \$1,712. The mineral during the year under review was obtained entirely from deposits located in the Hull-Buckingham district of the province of Quebec and was utilized in the manufacture of chemicals. The mineral as produced in Canada usually represents a by-product in the mining of mica.

The Department of Mines and Resources, Ottawa, reports that the only important recorded occurrences of phosphate rock in Canada are the Precambrian apatite deposits of the Ottawa-Kingston region in Ontario and Quebec, and the rather low-grade sedimentary phosphate of the Crowsnest district just west of the boundary between southern Alberta and British Columbia.

The Quebec and Ontario apatite deposits were once of considerable importance and were actively mined as a source of fertilizer phosphate, but the industry became unprofitable upon the discovery of the immense sedimentary phosphate deposits of the Southern United States about 1890. Enormous tonnages of apatite are now being produced by concentration from low-grade ores of the Murmansk region in Russia.

Although fertilizers will always continue to consume the great bulk of the world's phosphate produced, a growing future for phosphorous and its compounds appears to be assured. One of such chemicals that is rapidly coming into extensive use is tri-sodium phosphate, employed as a detergent in laundry work and as a general cleanser, as well as for preventing scale or scum in boiler-feed and washing waters, and in the tanning, photographic, sugar, and other industries.

The largest annual output of phosphate to be recorded in Canada was for 1890 in which year production was reported at 31,753 tons valued at \$361,045. The total production of the mineral in the Dominion from 1870 to the end of 1939 totalled 342,342 short tons valued at \$4,658,048.

Table 311.—Production of Phosphate in Canada, 1930-1939

Year	Short tons	\$	Year	Short tons	\$
1930.....	40	760	1935.....	186	1,103
1931.....			1936.....	625	4,927
1932.....	1,316	12,333	1937.....	160	900
1933.....	2,214	5,475	1938.....	208	1,886
1934.....	81	683	1939.....	157	1,712

Table 312.—Imports of Phosphate and Phosphate Products, 1937-1939

	1937		1938		1939	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
IMPORTS—						
Phosphate rock (*).....	113,970	453,599	128,409	455,697	124,901	477,317
Acid phosphate (not medicinal).....	202	23,186	422	48,070	432	52,618
Phosphorus and compounds, n.o.p.....	46	28,370	68	39,804	87	44,857
Superphosphate or acid phosphate of lime	100,726	952,775	114,356	1,092,859	104,126	979,052

(*) Since 1936 all from the United States.

Table 313.—Phosphate Rock and Superphosphate Used in the Manufacture of Canadian Fertilizers, 1931-1939

Year	Superphosphate		Phosphate rock	
	Short tons	\$	Short tons	\$
1931.....	51,639	595,789	48,373	395,547
1932.....	36,005	366,462	41,114	316,518
1933.....	59,443	657,123	21,961	164,614
1934.....	73,182	835,980	48,007	396,133
1935.....	86,701	986,674	74,507	610,118
1936.....	97,515	1,103,222	60,924	438,948
1937.....	137,801	1,661,243	101,704	726,572
1938.....	180,243	2,198,699	102,125	765,816
1939.....	174,989	2,026,293	96,319	711,508

"Metal and Mineral Markets"—New York—October, 1939—phosphate quotations—were—per long ton, f.o.b. mines: Florida pebble, domestic: 77 to 76 per cent, \$3.65; 75 per cent, \$2.90. Tennessee, ground lime phosphate, 85 per cent, through 300 mesh, 34·30 per cent P₂O₅, \$7.00 per short ton, bags extra.

Table 314.—World Production of Phosphate Rock, 1937, 1938 and 1939

(Imperial Institute, London)

(Long tons)

Producing Country	1937	1938	1939	Estimated Tribasic Phosphate of Lime Content or Equivalent		
				1937	1938	1939
BRITISH EMPIRE						
Tanganyika.....	102	104	425	(a)	(a)	
Seychelles (exports).....	9,442	21,360		(a)	(a)	
Canada.....	89	186	140	74		154
India.....	166	23		134		18
Christmas Island.....	162,568	159,859	171,161	138,500	136,200	
Australia.....	16	(a)		11	(a)	
Nauru Island.....	688,900	841,050		586,300	643,400	
Ocean Island.....	398,800	299,550		353,300	229,200	
Total.....	1,260,000	1,322,000				
FOREIGN COUNTRIES						
Belgium (b).....		(a)			(a)	
Estonia.....	9,952	12,806		4,349	5,596	
France.....	101,747	91,285		66,000	(a)	
Germany.....	3,262	(a)		1,780	(a)	
Italy.....	197			(a)		
Poland.....	(a)	(a)		(a)	(a)	
Roumania (d).....	935	1,940		(a)	(a)	
Sweden.....	4,839	6,094		3,880	4,447	
U.S.S.R.....	(a)	(a)		(a)	(a)	
Algeria.....	621,180	575,221		395,000	366,000	
Egypt.....	508,837	451,164	538,890	346,000	296,000	
Madagascar.....	4,222	5,602		3,200	4,150	
Morocco (French).....	1,455,156	1,464,021		1,030,000	1,126,000	
Tunis.....	1,757,100	1,906,300		1,050,000	1,170,000	
Netherlands West Indies.....	96,288	97,715		83,100	84,300	
United States.....	4,261,416	3,860,476	3,987,970	3,072,000	2,783,000	
Formosa.....	(a)	(a)		(a)	(a)	
French Indo-China.....	19,932	36,751		16,100	29,700	
China (estimated).....	8,000	8,000		6,500	6,500	
Japan.....	(a)	(a)		(a)	(a)	
Netherlands East Indies.....	25,754	32,590		17,300	21,800	
Philippine Islands.....	738	(a)		600	(a)	
Angaur Island (exports).....	89,220	103,910		71,400	83,200	
French Oceania.....	160,000	111,000		134,000	96,000	
New Caledonia.....	302	1,730				
Total.....	(a)	(a)				
World's Total.....	(a)	(a)				

(a) Information not available.

(b) In addition phosphatic chalk was produced as follows:—

1936.....	58,737 long tons
1937.....	51,444 "
1938.....	42,990 "

(d) Phosphatic guano, converted from cubic metres at the rate of 1 cubic metre = 2 long tons.

POTASH

The minerals yearbook of the United States Bureau of Mines for 1940 contains the following informations:—"With Europe again at war, no potash shortage now threatens the United States; there is no prospect that the farmer will have to pay exorbitant prices for his potash. This fortunate situation is directly attributable to the foresight that led the Federal Government to Pioneer in the search for Potash resources and to encourage and foster the building of a domestic industry that can now supply cheaply all the potash required for essential needs. In 1939 American producers supplied 634,000 short tons of potash salts, for which they realized an average of \$18.97 per ton at the plants. Natural brines and bedded saline deposits were the sources from which nearly 99 per cent of the 1939 output of potash was drawn. As in the past a small tonnage was derived from cement-plant dust and distillery waste. The potential capacity of American producers, without major additions to plants or equipment, has been estimated by the Federal Geological survey to be approximately 540,000 tons of K_2O per year, considerably more than probable needs. Any deficiency in high-grade salts that might develop can be made up by increased output of manure salts, which can be mined in New Mexico to average around 25 per cent K_2O . Some apprehension has been expressed concerning the supply of sulphate, for which the United States formerly depended almost entirely on imports; however this salt is now being produced by three companies.

"Publication of production statistics by European governments virtually ceased in the summer of 1939, and no adequate data are available for the latter half of the year".

In the United States a senate investigation of the potash industry was started in 1936. It was instituted to determine whether unfair or illegal practices were being employed in the exploitation of potash resources and the extent of foreign ownership or control of American potash companies.

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland County, Nova Scotia, and at Gautreau, Westmorland County, New Brunswick. Potassium chloride occurs at Malagash in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. The 1938 annual report of the Department of Public Works and Mines, Nova Scotia, refers to the Malagash occurrence as follows:—"There are two white seams of salt roughly parallel to each other called the Lucas and the McKay and which are being operated by the company. Approximately midway between these two seams a new zone was found in the upper levels carrying potash. This zone was not wide enough to be of commercial value but recent drilling from one seam to the other on the bottom levels has shown a considerable increase in the width of this potash zone and an increase in the potash content."

In a review of the Canadian salt industry in 1939 L. H. Cole, of the Bureau of Mines, Ottawa, states in part:—"In Nova Scotia, the Malagash Salt Company continued underground development by diamond drilling, cross cutting, and drifting. Definite zones in which indications of Potash salts occur have been correlated from the second level to the twenty-sixth level and there seems to be an increase in the potash content with depth. The study of these zones is being continued."

Table 315.—Potash Salts Used in the Manufacture of Canadian Mixed Fertilizers, 1938 and 1939

	1938		1939	
	Tons	Cost at works	Tons	Cost at works
Nitrate of potash.....	637	\$ 33,426	53	\$ 2,049
Kainite and potash manure salts.....	75	2,500	128	2,569
Muriate of potash.....	37,174	1,068,820	40,320	1,158,559
Sulphate of potash.....	5,866	220,512	4,452	166,322

Table 316.—Sales of Potash Salts for Fertilizer Purposes, other than for the Manufacture of Mixed Fertilizers, Years ended June 30, 1938, 1939

	1938	1939
	(Short tons)	
Muriate of potash.....	9,449	8,643
Sulphate of potash.....	700	534

Table 317.—Imports into Canada of Specified Potassium Compounds, 1938 and 1939

	1938		1939	
	Pounds	\$	Pounds	\$
Potash bicarbonate.....	10,488	924	13,584	1,310
Potash compounds, other.....	391,521	75,158	536,844	80,466
Kainite, or German potash salts and mineral.....	240,400	3,850	11,000	187
Cream of tartar (crystals).....	641,344	109,407	727,852	143,032
Potash and pearl ash.....	195,042	10,591	276,227	17,341
Potash, caustic.....	782,956	47,526	1,348,568	77,004
Potash, chlorate of.....	1,133,844	48,404	302,518	16,357
Saltpetre or nitrate of potash.....	2,310,365	73,030	1,486,526	55,512
Muriate of potash (fertilizer).....	†96,779,500	1,108,897	90,782,200	1,135,151
Potash, sulphate of, crude, (fertilizer).....	12,198,600	173,859	12,795,300	193,652
Potash, bichromate, crude.....	121,531	10,345	188,479	16,819
Potash prussiate.....	26,731	3,768	50,859	10,881

† 36,030,300 pounds from France.

Table 318.—World Production of Potash Minerals, 1937, 1938 and 1939

(Imperial Institute)

(Long tons)

Producing Country and Description	1937	1938	1939	K ₂ O Content or Equivalent		
				1937	1938	1929
BRITISH EMPIRE						
Palestine—						
Muriate (chloride).....	35,891	57,200		17,946	28,600	
India—						
Nitrate (estimated).....	8,900	7,700		4,200	3,900	
Australia—						
Alunite.....	334	438		(a)	(a)	
Total (estimated).....				22,100	32,500	
FOREIGN COUNTRIES						
France (b)—						
K ₂ O equivalent—						
Sylvinite, etc.:						
12-22%.....	651,463	815,369	}	482,064	572,000	
30-40%.....	179,397	254,299				
50% and over.....	499,608	573,265				
Germany—						
Kainite, sylvinite, etc.....	12,585,771	14,337,816	}	1,769,471	(c)	1,832,000
Carnallite, etc.....	1,646,003	1,844,772				
Italy—						
Alunite.....	3,445	2,734		400	320	
Poland—						
Kainite.....	109,598	118,228		10,960	11,820	
Sylvite.....	389,632	420,593		85,719	92,533	
Langbeinit.....	14,016	19,338		1,682	2,321	
U.S.S.R.—						
Crude salts.....	2,400,000	(a)		250,000	120,000	
Eritrea—						
Niccoli salts.....	(a)	(a)		(a)	(a)	
United States—						
Crude salts.....	434,009	477,629	468,738	254,015	282,992	274,153
Korea—						
Alunite (impure).....	147,000	(a)		(a)	(a)	
Total.....				3,000,000	2,900,000	
World's Total.....				3,000,000	2,900,000	

Potash minerals are also produced in Spain.

(a) Information not available.

(b) Crude salts mined were as follows:—1937—2,837,953 long tons.

1938—3,321,501

(c) Saleable products.

PYRITES (Sulphur)

The sulphur content of iron pyrites shipped and sulphur recovered from non-ferrous smelter gas in 1939 totalled 211,278 short tons valued at \$1,668,025 compared with 112,395 tons at \$1,044,817 in 1938. The quantity and value of Canadian sulphur output in 1939 were the greatest ever attained in Canadian mining history. Production in 1939, as in immediate preceding years, came from the provinces of Quebec, Ontario and British Columbia.

No iron pyrites deposits, known as such, have been mined in Canada for some years and statistics published regarding recent pyrites production refer to by-product iron pyrites recovered in the mining and concentrating of copper-gold-silver ores. The Matachewan Hub Pioneer Mines Ltd., with a pyrites deposit in Cairo township, District of Matachewan, Ontario, reported that research work was carried on during 1938 and a pilot plant was established in Toronto for the purpose of working out a process of sulphur and iron recovery. No mining development work was reported at the deposit during 1938 or 1939. This company stated that "Allied Iron and Sulphur Mines Limited", an associated company, planned to commence commercial shipments from the property in 1940.

Westario Sulphur Mines Limited, Hudson, Ontario, also reported that they expected to have iron pyrites ore ready for shipment early in 1940.

During 1939 iron pyrites was concentrated and shipped in the province of Quebec by the Aldermac Copper Corporation Limited, Beauchastel township; Noranda Mines Limited, Noranda, and by the Consolidated Copper and Sulphur Company Limited, Eustis; the last named company discontinued mining operations in 1939.

During 1939 Northern Pyrites Limited conducted development work on an iron pyrites deposit located on the east side of the Estall River, about 45 miles from Port Essington, British Columbia; no shipments of ore were reported.

Sulphur employed in the manufacture of sulphuric acid during 1939 was recovered from salvaged smelter gas in Ontario and British Columbia. In Ontario, Canadian Industries Limited continued the operation of its acid plant at Copper Cliff, using sulphur dioxide obtained from the smelter of the International Nickel Company, while in British Columbia the Consolidated Mining and Smelting Company of Canada, Limited, manufactured sulphuric acid and other chemical products at Trail, using the by-product gases of its metallurgical plants. The Consolidated Mining and Smelting Company reported that the percentage of sulphur dioxide removed from flue gases from metallurgical operations and utilized mainly in the production of sulphuric acid and fertilizers, increased to 70.3 per cent compared with 53.3 per cent in 1937.

"Mining and metallurgy, of the A.I. of M. & M.E. (July, 1939) states:—"Pyrites, largely used for the manufacture of sulphuric acid, is consumed in the United States to the extent of about a million long tons a year, half of which is normally produced there and half imported, mostly from Spain . . . Germany produces only a quarter of her requirements. Buyers of pyrites in the Eastern United States include the General Chemical Co., the Baugh Chemical Co., the Davison Chemical Co., and the F. S. Royster Guano Co., all of Baltimore; and to some extent the American Sheet and Tin Plate Co., Vandergrift, Pa., the Reliance Phosphate Co., of Savannah, the Monsanto Chemical Co., and the Maybank Fertilizer Co. Some of these have stocks sufficient for some months to come, but it would appear that some of them may soon be looking for new sources of supply."

"Metal and Mineral Markets"—New York—October, 1939, quotation for iron pyrites was per long ton unit of sulphur, c.i.f. United States ports, guaranteed 48 per cent sulphur, Spanish 12 cents. Sulphur—per long ton for domestic market \$16 f.o.b. Texas Mines. "Canadian Chemistry and Process Industries", Toronto, quoted sulphur September, 1939:—sulphur, crude, contracts, f.o.b. cars at mines, long ton \$18.00 to \$20.00; crude, contracts, ex vessel, St. Lawrence and Maritime ports long ton \$23.50-\$25.50. United States quotations for pyrites and sulphur May, 1940, were the same as for October, 1939.

Table 319.—Production of Sulphur† in Canada, 1930-1939

Year	Tons	\$
1930.....	37,730	314,835
1931.....	50,107	429,457
1932.....	53,172	470,014
1933.....	57,373	510,299
1934.....	51,537	515,502
1935.....	67,446	634,235
1936.....	122,132	1,033,055
1937.....	130,913	1,154,992
1938.....	112,395	1,044,817
1939.....	211,278	1,668,025

† Sulphur in iron pyrites shipped plus sulphur recovered from non-ferrous smelter gases.

Table 320.—Production in Canada of Pyrites with Sulphur Content, including Sulphur Contained in Sulphuric Acid, Etc., Made from Smelter Gases, 1938 and 1939

	Pyrites (*)			Smelter gas		Total sulphur	
	Sales	Sulphur content		Sulphur content		Tons	Value
	Tons	Tons	Value	Tons	Value		
1938			\$		\$		\$
Quebec.....	33,179	16,580	98,261	16,897	168,970	16,580	98,261
Ontario.....				(a) 73,121	731,210	16,897	168,970
British Columbia.....	11,425	5,797	46,376			78,918	777,586
Canada.....	44,604	22,377	144,637	90,018	900,180	112,395	1,044,817
1939							
Quebec.....	122,218	61,476	275,951	16,126	161,260	61,476	275,951
Ontario.....				(a) 80,703	807,030	16,126	161,260
British Columbia.....	105,418	52,973	423,784			133,576	1,230,814
Canada.....	227,636	114,449	699,735	96,829	968,290	211,278	1,668,025

(*) Recovered from copper ore deposits.

(a) Includes elemental sulphur and sulphur in sulphuric acid and direct ammonium sulphate.

Table 321.—Imports into Canada of Brimstone and Sulphur, 1931-1939

Year	Cwt.	\$	Year	Cwt.	\$
1931.....	2,483,842	2,281,654	1936.....	3,375,484	2,802,282
1932.....	2,099,895	2,023,085	1937.....	(a) 4,513,683	3,669,082
1933.....	2,816,202	2,529,920	1938.....	(b) 1,873,938	1,471,741
1934.....	3,153,943	2,589,311	1939.....	(c) 3,044,329	2,453,836
1935.....	2,733,499	2,297,650			

(a) 4,511,961 cwt. from the United States. (b) 1,872,536 cwt. from the United States. (c) 3,043,850 from the United States.

Table 322.—Exports of Sulphur Contained in Iron Pyrites, 1931-1939

Year	Tons	\$	Year	Tons	\$
1931.....	26,613	139,814	1936.....	52,192	284,718
1932.....	17,455	89,568	1937.....	46,317	251,834
1933.....	15,347	121,280	1938.....	122,109	145,189
1934.....	9,821	94,623	1939.....	110,142	793,466
1935.....	7,610	48,446			

† 16,551 tons valued at \$115,881 to the United States in 1938 and 93,957 tons at \$636,938 in 1939.

Production of sulphuric acid in Canada totalled 249,558 tons (66° B \acute{e}) in 1939 compared with 268,339 tons in 1938. Canadian plants manufacturing sulphuric acid in 1939 were located at Copper Cliff, Sulphide, and Hamilton in Ontario; New Westminster, Barnet, and Trail in British Columbia, and Sydney, Nova Scotia.

Table 323.—Consumption of Sulphur by Specified Canadian Industries, 1938 and 1939

Industry	1938		1939	
	Tons	\$	Tons	\$
Wood-pulp.....	106,255	2,433,161	126,818	2,763,657
Petroleum refining.....	140	8,128	88	4,161
Acids, alkalies and salts.....	12,103	246,774	13,894	286,296
Matches.....	67	3,130	84	3,924
Explosives.....	2,284	60,712	1,862	39,285
Insecticides.....	1,163	40,463	1,284	54,735
Adhesives.....	71	2,487	66	1,904
Chemicals, miscellaneous.....	3	136	3	129
Rubber.....	1,115	49,262	1,269	58,977
Sugar.....	133	6,280	152	7,379
Fruit and vegetable preparations.....	20	1,525	36	3,131
Other industries (*).....	195	7,177	227	8,687

(*) Starch and glucose, dyeing and finishing of textiles.

Table 324.—World Production of Pyrites, 1937, 1938 and 1939

(including Cupreous Pyrites)

(Imperial Institute, London)

(Long tons)

Producing Country	1937	1938	1939	Estimated Sulphur Content		
				1937	1938	1939
BRITISH EMPIRE						
United Kingdom.....	4,627	4,282	.....	(a)	(a)	.....
Southern Rhodesia.....	20,020	26,638	26,954	8,000	10,700	.....
Union of South Africa.....	28,378	30,528	.....	12,727	13,727	.....
Canada (c).....	106,659	39,825	29,354	53,733	19,979	.....
Cyprus.....	796,196	972,040	203,246	398,098	486,020	.....
Australia.....	40,630	50,277	843,296	(a)	(a)	.....
Total.....	964,000	1,124,000	1,103,000	.....	.....	.....
FOREIGN COUNTRIES						
Czecho-Slovakia.....	18,071	(a)	.....	7,590	(a)	.....
Finland (b).....	89,969	101,353	115,153	40,500	45,600	.....
France.....	143,604	144,883	.....	64,000	65,000	.....
Germany.....	417,354	410,000	.....	176,672	173,000	.....
Greece.....	203,386	240,000	.....	98,709	99,800	.....
Italy.....	900,080	915,619	.....	420,000	430,000	.....
Norway.....	1,031,744	1,011,544	.....	445,557	439,880	.....
Poland.....	80,963	90,753	.....	34,800	39,000	.....
Portugal.....	594,590	549,509	494,379	279,500	258,300	.....
Roumania.....	10,548	11,028	6,136	6,611	6,950	.....
Sweden.....	170,236	183,446	.....	74,147	83,013	.....
Yugoslavia.....	131,922	148,027	125,970	59,400	66,600	.....
Algeria.....	38,148	43,256	.....	16,786	20,260	.....
United States (d).....	584,166	555,629	516,408	231,800	218,900	.....
Japan.....	(a)	(a)	.....	(a)	(a)	.....
Korea.....	77,250	(a)	.....	(a)	(a)	.....
Manchuria.....	(a)	(a)	.....	(a)	(a)	.....

Pyrites is also produced in Belgium, Spain, U.S.S.R. and China.

(a) Information not available.

(b) Pyrite concentrate only.

(c) Includes pyrite ore, also concentrates made from copper ores.

(d) Includes by-product pyrite from zinc operations in Wisconsin and New York, and pyrite and pyrrhotite concentrates from copper operations in Tennessee.

SILICA BRICK

The production of silica brick in Canada during 1939 totalled 2,493 M valued at \$124,807 compared with 1,788 M worth \$100,403 in 1938. The manufacture of these refractories was confined, in both years, to the plants of the Dominion Steel and Coal Company, Ltd., at Sydney, Nova Scotia, and the Algoma Steel Corporation Ltd., Sault Ste. Marie, Ontario. The brick manufactured by both of these companies are processed from crushed silica rock and are utilized in furnace construction and repairs.

Table 325.—Production of Silica Brick in Canada, 1928-1939

Year	M	\$	Year	M	\$
1928.....	3,224	155,502	1934.....	2,528	85,945
1929.....	13,951	173,581	1935.....	2,461	96,194
1930.....	2,418	97,379	1936.....	2,393	97,285
1931.....	900	35,740	1937.....	3,744	(a) 181,126
1932.....	93	4,304	1938.....	1,788	100,403
1933.....	636	23,185	1939.....	2,493	124,807

† Largest annual output.

(a) Largest annual value.

Table 326.—Imports of Silica Brick* into Canada, 1931-1939

Year	\$	Year	\$
1931.....	234,909	1936.....	(a) 261,974
1932.....	122,952	1937.....	(b) 539,253
1933.....	147,901	1938.....	(c) 240,184
1934.....	210,190	1939.....	(d) 312,413
1935.....	215,500		

(*) Containing not less than 90 per cent silica.

(a) \$261,952 from the United States.

(b) \$527,444 from the United States.

(c) All from the United States.

(d) \$294,228 from the United States.

SODIUM CARBONATE (NATURAL)

Production of natural sodium carbonate in Canada during 1939 totalled 300 short tons valued at \$2,400 compared with 252 tons at \$2,268 in 1938. Deposits of this material in the form of "natron" (sodium carbonate with 10 molecules of water) and also as brine, occur in a number of "lakes" throughout the central part of the province of British Columbia, chiefly in the Clinton mining division, around 70 Mile House, and in the neighbourhood of Kamloops. Production in Canada during recent years has come entirely from deposits in British Columbia and in 1939 all commercial shipments of primary or mine material were made from 70 Mile and Chasm on the line of the Pacific Great Eastern Railway. The first commercial shipments of natural sodium carbonate from Canadian deposits were recorded for 1921 in which year 197 short tons valued at \$14,775 were reported as sold. The total Canadian production of the material to the end of 1939 totalled 8,459 short tons valued at \$99,870.

Table 327.—Production of Sodium Carbonate (Natural) in Canada, 1929-1939

Year	Tons	\$	Year	Tons	\$
1929.....	600	8,100	1935.....	242	2,430
1930.....	364	4,550	1936.....	192	1,677
1931.....	712	7,351	1937.....	286	2,574
1932.....	495	5,450	1938.....	252	2,268
1933.....	559	5,773	1939.....	300	2,400
1934.....	244	1,920			

Table 328.—Consumption of Soda Ash (Sodium Carbonate) in Specified Canadian Industries

Industry	Unit	1933		1939	
			\$		\$
Chemicals and allied products (a).....	pounds	30,034,048	437,833	31,320,339	437,443
Manufactures of non-metallic minerals (b).....	pounds	59,092,431	757,283	55,444,267	607,277
Pulp and paper.....	tons	2,166	73,236	2,538	83,548
Textiles (dyeing and finishing).....	pounds	299,601	5,575	346,476	6,686
Sugar refineries.....	pounds	189,171	4,118	128,987	2,619
Dyeing, cleaning and laundry work.....	pounds	860,315	22,073	789,244	21,119

(a) Includes acids, salts, explosives, soap, etc.

(b) Includes coke and gas, glass and petroleum refining.

Table 329.—Imports of Bicarbonate of Soda and Soda Ash, 1931-1939

Years	Bicarbonate of soda		Soda ash or barilla	
	Pounds	\$	Pounds	\$
1931.....	10,931,335	188,268	1,647,304	25,771
1932.....	10,592,208	196,841	1,803,951	27,751
1933.....	11,716,431	211,065	1,616,483	23,256
1934.....	11,918,011	205,058	2,311,498	32,253
1935.....	12,009,724	207,325	2,647,572	37,995
1936.....	11,927,818	187,904	3,184,682	43,503
1937.....	12,835,249	199,011	†10,103,477	113,219
1938.....	12,456,313	185,940	2,908,364	41,831
1939.....	16,645,777	269,756	3,145,499	45,377

† 10,101,867 pounds from the United States and 1,610 pounds from the United Kingdom in 1937 and 2,907,264 pounds at \$41,808 from the United States in 1938.

"Canadian Chemistry and Metallurgy"—Toronto—quoted soda ash (September, 1939)—bags of 100 pounds, \$2.00.

SODIUM SULPHATE

(Glauber's Salt and Salt Cake)

Producers' shipments of natural sodium sulphate in Canada totalled 71,485 short tons valued at \$628,151 in 1939 compared with 63,009 tons at \$553,307 in 1938.

Sodium sulphate is recovered in Canada almost entirely in the province of Saskatchewan and is produced either as hydrated sodium sulphate, known as Glauber's salt, or anhydrous sodium sulphate, known to the trade as "salt cake". It occurs as crystals (Glauber's salt) or in the form of partially saturated or saturated brines in many lakes throughout Western Canada. Some of the Saskatchewan properties are equipped with plants for the purification and dehydration of the crude salt. It is interesting to note that a relatively small commercial output of the mineral has been reported in the province of Alberta since 1937. The increased demand for sodium sulphate from the pulp mills and the nickel-copper smelting industry was largely responsible for the large increase in output of sodium sulphate in recent years.

The International Nickel Company of Canada Limited reported that in 1939 the sodium sulphate works of the Horseshoe Lake Mining Company, Limited, at Ormiston, Saskatchewan, were operated to capacity from January to April, inclusive, and from April to September at the rate of five and a half days per week, when operations were suspended. Ample stocks of sodium sulphate, an important flux for use in the Copper Cliff smelter, have been accumulated.

The total commercial shipments of Canadian natural sodium sulphate since the commencement of production in 1920 to the close of 1939 totalled 581,786 short tons valued at \$4,999,697.

During 1939 seven firms, five in Saskatchewan and two in Alberta, reported production of natural sodium sulphate; capital employed by the industry was reported at \$896,818; fuel, purchased electricity and process supplies consumed totalled \$179,609 and \$136,416 were distributed as salaries and wages to 102 employees.

"Canadian Chemistry and Metallurgy"—Toronto—(September, 1939)—quoted sodium sulphate (Glauber's salt), crystals, in bags, cwt., to \$1.25; carlots, bulk—\$16.00 per ton; anhydrous, bags \$25.00 to \$35.00 per ton.

Table 330.—Production of Natural Sodium Sulphate* in Canada, 1929-1939

Year	Short tons	\$	Year	Short tons	\$
1929.....	5,018	64,112	1935.....	44,817	343,764
1930.....	31,571	293,847	1936.....	75,598	552,681
1931.....	44,957	421,097	1937.....	79,804	617,548
1932.....	22,466	271,736	1938.....	63,009	553,307
1933.....	50,080	485,416	1939.....	71,485	628,151
1934.....	66,821	587,986			

(*) Produced in the province of Saskatchewan, with the exception of 80 tons valued at \$480 produced in Alberta during 1937, 89 tons worth \$1,127 produced in the same province in 1938 and 30 tons at \$186 in 1939.

Table 331.—Salt Cake Used in the Manufacture of Canadian Wood-Pulp and in the Acids, Alkalies and Salts Industry, 1932-1939

Year	Medicinal and pharmaceutical industry		Acids, alkalies† and salts industry		Wood-pulp	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1932.....			94	1,811	24,301	489,343
1933.....	39	4,879	9,968	146,201	29,563	580,251
1934.....	51	7,278	26,075	368,576	34,559	655,905
1935.....	59	4,617	22,485	316,734	35,350	642,801
1936.....	27	2,546	7,220	102,176	41,524	711,635
1937.....	29	2,234	8,006	113,054	50,584	884,437
1938.....	21	1,593	3,412	48,456	33,213	588,217
1939.....	24	1,940	11	314	40,685	722,178

† The 1932, 1936, 1937, 1938 and 1939 figures do not include sodium sulphate consumed direct in the smelting of nickel-copper ores.

In 1938 there were 645,306 pounds of Glauber's salt valued at \$8,419 used in Canada in the dyeing and finishing of textiles.

In the Southern States, some of the pulp mills are employing a synthetic material made from soda-ash and sulphur, as a substitute for salt cake in the manufacture of kraft paper.

It was reported in 1939 that another drill hole in the Weldon district, New Brunswick, encountered the glauberite-salt beds, thus extending the area of the basin already known to be underlain by these salts. The Bureau of Mines, Ottawa, reported that the operating plants in Western Canada are now capable of producing over 900 tons of dried salts per day, and, if occasion warranted, the tonnage could be greatly increased.

Table 332.—Imports of Glauber's Salt and Salt Cake into Canada, 1931-1939

Year	Glauber's Salt		Salt Cake (Sulphate of Soda)	
	Pounds	\$	Pounds	\$
1931.....	1,999,042	10,838	17,321,652	97,215
1932.....	1,806,882	11,027	8,865,730	51,925
1933.....	1,791,011	13,237	5,191,036	34,371
1934.....	1,266,665	8,853	21,154,815	123,980
1935.....	3,167,715	26,591	10,352,070	49,354
1936.....	*2,510,103	27,521	(a)23,494,805	110,676
1937.....	†3,512,363	25,090	(b)28,234,278	132,352
1938.....	(c)4,532,986	30,258	(d)11,572,628	61,122
1939.....	2,660,372	20,102	(e)13,083,040	73,575

* Of the 1936 imports, 2,037,970 pounds came from Germany, 248,716 pounds came from the United States and 80,784 pounds came from the United Kingdom.

(a) Of the 1936 imports, 9,202,877 pounds came from the United States and 14,291,928 pounds from the United Kingdom.

† Of the 1937 imports 3,307,638 pounds valued at \$21,882 came from Germany.

(b) Of the 1937 imports 17,755,034 pounds valued at \$78,168 came from the United States and 10,479,244 pounds at \$54,184 from the United Kingdom.

(c) 4,344,748 pounds at \$26,706 from Germany.

(d) 9,537,472 pounds at \$50,809 from the United Kingdom.

(e) 8,294,272 pounds from the United Kingdom.

STRONTIUM MINERALS

Four celestite (Sr SO_4) deposits of economic interest occur in eastern Ontario but there has been no commercial production of the mineral in Canada for several years. A special report prepared by the Imperial Institute, London, refers to strontium minerals, as follows—"The reserves of strontium minerals, however, in both England and Germany appear to be limited, and it is possible that the known deposits in Canada, United States, France, Tunis, and the U.S.S.R. will be opened up and exploited to an increasing extent in the future. . . . Strontium minerals are used principally in the beet-sugar industry; in pyrotechnics; as fillers; as 'cleansers' for removing sulphur and phosphorous from special steels; as precipitants in the purification of caustic soda; in the chemical, pharmaceutical and ceramic industries; and in certain refrigerators".

Strontium nitrate is used in Canada in the manufacture of pyrotechnics but the amount is not available for publication. No production of strontium ore in the United States has been reported since 1918 and domestic needs in that country are supplied by imports which in 1938 comprised 552,868 pounds of strontionite and celestite valued at \$2,824; strontium nitrate 364,362 pounds at \$23,921 and precipitated carbonate (and oxide) 82,859 pounds worth \$8,502. Data relating to Canadian imports of strontium minerals and chemicals are not shown separately in the Canadian customs classification.

"Metal and Mineral Markets" New York, October, 1939, quoted—per ton in carload lots, 90 per cent Sr SO₄, finely powdered, \$37. Strontionite—per ton, lump in carload lots, minimum 84-86 per cent Sr CO₃ \$55—nominal.

Table 333.—Production of Miscellaneous Non-Metallic Minerals in Canada, 1938 and 1939

Item	Unit of measure	1938		1939	
		Quantity	Value	Quantity	Value
			\$		\$
Barytes.....	Ton			(d)	3,639
Diatomite (c).....	Ton	398	13,842	301	10,388
Fluorspar.....	Ton	217	3,906	240	4,995
Graphite.....	\$		41,590		61,684
Grindstones (b) (c).....	Ton	306	16,198	304	15,278
Lithium minerals.....	\$				
Magnesium sulphate.....	Ton	470	9,400	550	9,900
Magnesitic-dolomite.....	\$		420,261		474,418
Mineral waters.....	Imp. gal.	188,309	21,619	123,769	19,105
Peat production.....	Ton	620	3,500	445	2,445
Phosphate (a).....	Ton	208	1,886	157	1,712
Silica brick.....	M	1,788	100,403	2,493	124,807
Sodium carbonate.....	Ton	252	2,268	300	2,400
Sodium sulphate.....	Ton	63,009	553,307	71,485	628,151
Total (Gross).....	\$		1,188,180		1,358,922
Sulphur production (*).....	Ton	112,395	1,044,817	211,278	1,668,025

(a) Represents apatite mined in Quebec, usually a by-product in mica production.

(b) Includes pulpstones, etc.

(c) In preceding years included under the natural abrasives industry.

(d) Not available for publication.

(*) Includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid-making or recovered as elemental sulphur, or in ammonium sulphate (direct). General statistics relating to production of sulphur included with those of the copper-gold mining and non-ferrous smelting industries.

Table 334.—Principal Statistics Relating to Miscellaneous Non-Metal Mining Industries in Canada, 1938 and 1939 (a)

	1938	1939
Number of plants.....	50	47
Capital employed..... \$	2,787,671	3,128,035
Number of employees—On salary.....	71	68
On wages.....	323	397
Total.....	394	465
Salaries and wages—Salaries..... \$	134,727	140,202
Wages..... \$	340,840	398,941
Total..... \$	475,567	539,143
Selling value of products (gross)..... \$	1,188,322	1,358,922
Cost of fuel and electricity..... \$	274,670	260,652
Cost of process supplies used..... \$	134,559	133,705
Selling value of products (net)..... \$	779,093	964,565

(a) Statistics since 1937 are not entirely comparable with those for preceding years in that data relating to production of natural abrasives were included with "miscellaneous non-metallic minerals" for the first time in 1937.

Table 335.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1939

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	736,523
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,662,849
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	162,038
Inventory value of finished products on hand.....	116,358
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	450,267
Total.....	3,128,035

Table 336.—Wage-earners, by Months, in the Miscellaneous Non-Metal Mining Industries in Canada, 1938-1939

Month	1938	1939		
		Surface	Under-ground	Mill
January.....	282	102	21	93
February.....	304	105	21	112
March.....	287	126	19	103
April.....	288	138	19	113
May.....	328	261	41	123
June.....	377	299	50	136
July.....	282	313	40	98
August.....	346	301	37	136
September.....	389	243	41	169
October.....	347	261	51	176
November.....	350	261	45	175
December.....	263	260	31	182
Average.....	323	222	35	135

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, and Stone, including Slate.

Grouped in this chapter are those industries producing structural materials of non-metallic composition. During the depression years, immediately following 1929, these important branches of the Canadian mineral industry suffered severe economic losses. Production declined and employment fell to a relatively low level. Shipments of cement, lime, stone, clay products, sand and gravel totalled \$58,534,834 in 1929; this high record value was succeeded by unbroken annual decreases to \$16,696,683 in 1933, from which year recovery has been relatively slow, however, a distinct advance was realized in 1937 when the value of these materials aggregated \$34,869,699 or an increase of 35·31 per cent over the corresponding value of \$25,770,741 in the preceding year. In 1938 there was a slight increase over 1937 in the value of clay products also the output of sand and gravel was considerably greater, however, the total value of all structural materials produced in 1938 at \$33,878,666 represents a decrease of \$999,033 from the corresponding value of the preceding year. Production of structural materials (Primary) in Canada during 1939 realized a marked improvement over 1938; the value of clay products totalled \$5,151,236 against \$4,536,084 in 1938 while the combined value of stone, lime, cement, sand and gravel in 1939 totalled \$30,211,523 compared with \$29,342,582 in the preceding year. The increase in construction of defence works, such as, airports, military camps, barracks, etc., was reflected in the increase in output of certain structural materials, especially after the outbreak of war in September.

There has been an increasing consumption of stone and lime for other than building purposes. This has been particularly evident in recent years and is the result of expansion in certain industries where these materials are utilized in various chemical processes. Shipments of stone and lime for these purposes are classified, for convenience, with data relating to production of these same materials for structural purposes. However, statistics pertaining to their consumption for industrial purposes are segregated in the following tables.

Table 337.—Value of Construction Contracts Awarded, by Provinces, 1934-1939

(Maclean Building Reports Ltd.)

Provinces	1934	1935	1936	1937	1938	1939
	\$	\$	\$	\$	\$	\$
Maritimes.....	9,968,600	14,373,500	17,908,800	21,557,200	19,522,800	16,146,300
Quebec.....	34,135,500	44,471,900	45,749,500	71,940,800	65,778,900	62,846,600
Ontario.....	63,358,300	70,872,800	72,393,300	97,777,400	73,070,100	82,605,500
Manitoba.....	3,905,000	8,744,400	6,994,400	7,945,100	6,115,200	5,374,400
Saskatchewan.....	1,563,200	3,841,300	2,200,600	6,704,900	3,969,000	3,246,100
Alberta.....	3,489,400	5,893,000	6,297,400	4,901,000	8,180,000	5,234,900
British Columbia.....	9,391,500	12,108,100	11,044,000	13,230,300	10,641,900	11,724,700
Canada.....	125,811,500	160,305,000	162,588,000	224,056,700	187,277,900	187,178,500

Table 338.—Description and Total Value of Work Performed in Canada by General and Trade Contractors (including Subcontractors), Municipalities, Harbour Commissions, Provincial and Dominion Government Departments in 1937, 1938 and 1939

(Construction Branch, Dominion Bureau of Statistics)

	1937	1938	1939
	Total value	Total value	Total value
	\$	\$	\$
BUILDING CONSTRUCTION—			
Dwellings, single.....	29,231,314	30,709,570	35,895,781
Dwellings, semi-detached or double.....	2,728,090	3,324,336	3,621,498
Duplexes.....	2,890,972	4,445,338	4,076,413
Apartment houses.....	5,825,241	7,944,612	10,332,737
Hotels, clubs, restaurants, etc.....	3,174,010	2,556,126	3,087,520
Churches and church halls.....	2,538,511	3,062,767	2,519,601
Hospitals and sanatoria.....	3,791,606	7,334,820	6,435,780
Schools, institutions, etc.....	7,260,284	11,831,167	12,258,934
Office buildings.....	8,362,412	8,013,402	11,922,075
Stores.....	7,915,622	9,755,082	8,199,790
Theatres and amusement halls.....	1,665,743	2,541,028	2,691,078
Factories, warehouses and storehouses.....	35,982,590	24,275,807	29,802,267
Elevators, grain.....	3,281,431	3,445,073	4,035,501
Garages.....	2,246,870	1,770,986	1,785,993
Service stations.....	2,122,145	3,337,899	3,212,679
Mine buildings.....	4,799,235	4,615,059	6,852,561
Farm buildings.....	1,344,309	1,426,214	1,500,149
Radio stations.....		263,697	162,409
Armouries and barracks.....		427,223	5,865,832
Aeroplane hangars.....		513,426	720,534
Buildings, unable to specify.....	5,378,613	3,318,543	4,061,948
ENGINEERING CONSTRUCTION—			
Hard surfaced or paved streets, highways, etc.....	38,625,244	32,129,962	30,193,118
Gravel or stone surfaced streets, highways, etc.....	29,914,507	33,342,919	33,935,054
Dirt or clay roads.....	7,620,496	6,564,092	5,102,197
Grading, scraping, oiling, filling, etc.....	12,522,674	12,554,539	11,581,275
Sidewalks.....	1,255,254	2,573,840	1,478,354
Roadside maintenance and area improvement.....	2,127,635	1,814,980	2,600,690
Bridges, viaducts, all types.....	12,351,378	9,919,754	7,682,113
Subways, overhead crossings, etc.....	729,891	717,952	896,253
Culverts.....	2,352,746	2,239,018	1,551,180
Watermains and connections.....	4,870,399	6,400,418	6,073,691
Sewers and connections.....	2,572,193	3,135,094	3,857,357
Storm sewers.....	1,062,043	1,905,142	975,910
Tile drains, drainage ditches and open sewers.....	529,453	548,787	700,269
Dams and reservoirs.....	1,904,123	2,404,864	3,035,859
Fencing (excluding temporary snow fencing).....	890,980	887,226	990,758
Guard rails.....	274,645	211,004	378,646
Signs.....	242,135	396,499	292,700
Zone painting.....	124,682	143,017	113,602
Electric stations, power plants, etc.....	14,988,028	20,641,445	19,357,574
Transmission lines and towers.....	9,593,047	7,318,056	7,960,817
Installation of boilers and machinery.....		229,013	
Railway (steam) construction work.....	2,631,983	265,680	946,400
Railway (electric) construction work.....	247,476		
Aerodromes or landing fields.....	1,172,125	3,521,118	4,174,974
Park systems.....	1,895,226	1,838,475	3,498,090
Grounds and walks.....	312,204	348,226	
Underground conduits.....	261,705		716,503
Telephone and telegraph lines.....			201,798
Gas mains and connections.....			3,359
Engineering, unable to specify.....	7,588,801	4,360,444	2,064,243
HARBOURS, RIVERS ETC.—			
Docks, wharves, piers and breakwaters.....	8,001,048	6,548,349	6,961,967
Retaining walls, embankments and riprapping.....	1,361,085	1,785,239	2,270,291
Canals and waterways.....	369,541	460,626	651,382
Dredging.....	4,654,314	6,261,867	6,366,586
Pile driving.....	258,390	137,745	224,447
Works, unable to specify.....	13,894	23,141	1,465,482
TRADE CONSTRUCTION—			
Air conditioning.....	613,650	783,773	536,657
Bricklaying.....	903,156	883,143	911,309
Carpentry work.....	1,206,546	1,862,973	1,953,966
Commercial refrigeration.....	903,428	565,040	638,114
Concreting and cement work.....	967,629	1,005,764	1,008,968
Electrical work.....	5,224,308	5,359,723	4,568,876
Elevators, service.....	1,982,697	1,970,545	2,003,070
Excavating.....	1,187,579	646,958	1,453,400
Flooring.....	404,601	470,465	469,928
Glass and glazing.....	579,095	753,589	913,370
Lathing, plastering and stucco.....	1,263,421	1,205,389	993,089
Masonry and stone work.....	306,398	279,974	182,213
Ornamental iron work.....	298,097	431,804	374,304
Painting and decorating.....	4,964,660	5,019,961	5,158,520
Plumbing, heating and sanitary engineering.....	16,363,778	15,835,689	15,362,518
Roofing, sheet metal.....	1,076,686	1,027,800	958,791
Roofing, all other.....	1,961,479	2,034,562	2,029,321
Sheet metal work, other than roofing.....	3,041,028	2,889,782	2,638,414
Sprinkler installation.....	577,956	342,924	559,715

Table 338.—Description and Total Value of Work Performed in Canada by General and Trade Contractors (including Subcontractors), Municipalities, Harbour Commissions, Provincial and Dominion Government Departments in 1937, 1938 and 1939—Con.

(Construction Branch, Dominion Bureau of Statistics)

	1937	1938	1939
	Total value	Total value	Total value
	\$	\$	\$
TRADE CONSTRUCTION—Concluded			
Structural steel work.....	1,652,550	850,385	1,368,600
Tiling, marble and terrazzo.....	743,028	609,072	704,236
Weatherstripping and insulation.....	683,381	621,593	676,105
Wrecking and demolition.....	226,287	231,176	186,451
Trades, unable to specify.....	880,328	1,000,495	209,726
Total value of work performed.....	351,874,114	353,223,285	373,203,680

Table 339.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1935-1939

Province	1935	1936	1937	1938	1939
	\$	\$	\$	\$	\$
Prince Edward Island.....		*27,663			
Nova Scotia.....	1,660,981	1,763,516	2,293,325	1,611,111	1,829,207
New Brunswick.....	1,241,957	931,827	1,128,931	2,188,889	1,911,041
Quebec.....	7,241,494	7,503,022	10,350,563	11,619,514	12,319,773
Ontario.....	8,894,538	10,326,967	15,121,178	11,997,177	12,856,694
Manitoba.....	1,459,614	1,666,789	1,673,124	1,805,875	1,646,797
Saskatchewan.....	269,320	380,115	585,673	781,224	556,973
Alberta.....	973,774	1,245,549	1,303,533	1,627,462	1,947,453
British Columbia.....	1,473,722	1,925,293	2,413,352	2,247,414	2,314,821
Canada—Gross value.....	23,215,400	25,770,741	34,869,699	33,878,666	35,382,759
Net value.....	19,253,309	21,052,574	28,868,189	28,446,299	29,628,817

* Sand and gravel.

Table 340.—Production, Imports, Exports, and Apparent Consumption of Clay Products and Other Structural Materials in Canada, 1935-1939

Item	Production	Imports	Exports	Apparent consumption
	\$	\$	\$	\$
Cement, Portland.....	1935 5,580,043	†77,181	44,365	5,612,859
	1936 6,908,192	†114,321	56,909	6,965,604
	1937 9,095,867	†179,857	82,978	9,192,746
	1938 8,241,350	†111,976	101,059	8,252,267
	1939 8,511,211	†73,284	159,579	8,424,916
Clay and clay products.....	1935 3,012,563	6,438,042	526,824	8,923,781
	1936 3,471,027	7,351,148	777,143	10,045,032
	1937 4,516,859	9,108,976	1,056,767	12,569,068
	1938 4,536,084	7,657,202	1,034,148	11,159,138
	1939 5,151,236	7,934,630	1,004,370	12,081,496
Lime.....	1935 2,925,791	9,181	50,296	2,884,676
	1936 3,335,970	12,036	97,574	3,250,432
	1937 3,824,917	32,379	85,089	3,772,207
	1938 3,542,652	36,248	51,346	3,527,554
	1939 4,003,514	33,342	75,172	3,961,684
*Sand and gravel.....	1935 6,389,440	364,693	21,446	6,732,687
	1936 6,921,399	348,492	73,624	7,196,267
	1937 10,492,696	471,367	78,441	10,885,622
	1938 12,002,554	401,317	146,050	12,257,821
	1939 11,241,102	418,610	79,415	11,580,297
Stone (a).....	1935 5,307,563	452,312	110,895	5,648,980
	1936 5,134,153	482,681	105,182	5,511,652
	1937 6,939,360	747,518	250,458	7,436,420
	1938 5,556,026	481,868	220,145	5,817,749
	1939 6,455,696	570,157	(a) 13,130	7,012,723
Total.....	1935 23,215,400	7,341,409	753,826	29,802,983
	1936 25,770,741	8,308,678	1,110,432	32,968,987
	1937 34,869,699	10,540,097	1,553,733	43,856,063
	1938 33,878,666	8,688,611	1,552,748	41,014,529
	1939 35,362,759	9,030,023	1,331,666	43,061,116

* Sand and gravel imports include silica sand for glass and carborundum manufacture and for use in steel plants. This silica sand was valued at \$282,930 in 1935, \$270,824 in 1936, \$373,760 in 1937, \$338,832 in 1938 and \$349,256 in 1939.

† Includes cement manufactures which totalled \$6,650 in 1938 and \$14,968 in 1939.

(a) Prior to 1939 includes value of silica rock (quartzite flux); this rock not included in 1939.

CEMENT INDUSTRY

Producers' sales of cement, as reported by the Canadian Cement Industry, totalled 5,731,264 barrels valued at \$8,511,211 in 1939, compared with 5,519,102 barrels worth \$8,241,350 in 1938. Of the 1939 sales, 3,027,759 barrels were produced in Quebec plants, 1,709,263 barrels in Ontario, 343,717 barrels in Manitoba, 377,846 barrels in Alberta and 272,679 barrels in British Columbia. The high and low prices per barrel in both 1939 and 1938 were \$2.35 and \$1.25 respectively.

The number of firms reporting commercial production of cement in Canada during 1939 was three and the plants in operation totalled eight. Capital employed aggregated \$51,251,358 and the industry distributed \$1,297,542 in salaries and wages to 1,001 employees. The total value of fuel and electricity purchased during the year under review amounted to \$1,705,981, of which \$1,092,407 were expended for coal and \$589,190 for electricity. Process supplies consumed, including explosives, etc., were valued at \$532,058 and the following tonnage of primary materials of mineral origin were used in the manufacture of the final product: limestone, 1,379,858; clay, 105,982; gypsum, 31,492; shale, 27,241; sand, 7,942, and iron pyrites, 16. Imports of Portland cement into the Dominion in 1939 totalled 16,620 barrels worth \$58,316 compared with 48,497 barrels valued at \$105,326 in 1938. Exports in 1939 totalled 156,556 barrels valued at \$159,579 as against 89,419 barrels worth \$101,059 in the preceding year.

In 1939, as in the preceding year, the wet process was employed in all Canadian cement plants with the exception of one plant in Alberta where the dry method was continued.

"Portland cement is the product that is obtained by pulverizing, to a fine consistency, a clinker produced by calcining to incipient fusion an intimate mixture of properly proportioned argillaceous and calcareous substances, with only such additions, subsequent to calcining, as may be necessary to control setting and certain other properties. Such additions, which usually comprise about 3 to 3½ per cent by weight of the calcined product, consist principally of gypsum or mixtures of gypsum and anhydrite. The principal combinations of raw materials are (1) limestone with clay or shale, (2) cement rock (argillaceous limestone either alone or with high calcium limestone), (3) blast-furnace slag and limestone, (4) marl and clay, and (5) oyster shells and clay.

"Some years ago all Portland cement had fairly constant and uniform properties; in other words, there was only one standard Portland cement. In recent years the varied demands of construction have led to the development of a variety of Portland cements each adapted to a particular use. These include high-early-strength, masonry, low heat, and oil well cements. . . ." (U.S. Bureau of Mines).

In Ontario, Medusa Products Company of Canada, Limited, began operations at Paris, in June, 1938, manufacturing white Portland cement, waterproofed white Portland cement, white masonry cement, cement paints, etc., from imported clinker. Since this Company does not process domestic materials, the statistics relating to their operations have been included in the Cement Products Industry, as reviewed in the following pages.

According to the Bureau of Mines, Ottawa, a recent development of interest to all manufacturers of cement is the application of froth flotation to remove a portion of the siliceous material from limestone. This process is now in use in several parts of the world and limestone deposits, advantageously situated but too impure in their natural state for cement manufacture, can now be utilized.

Table 341.—Summary Statistics of Cement Production, Sales, Etc., in Canada, 1938 and 1939

	1938		1939	
	Barrels (*)	Value	Barrels (*)	Value
		\$		\$
Output.....	5,588,047		5,721,447	
Sold or used.....	5,519,102	8,241,350	5,731,264	8,511,211
Stocks on hand December 31st.....	1,875,288		1,865,471	
IMPORTS—				
Portland cement and hydraulic or water lime.....	48,497	105,326	16,620	58,316
Manufactures.....		6,650		14,968
Total imports.....		111,976		73,284
EXPORTS—				
Portland cement.....	89,419	101,059	156,556	159,579
Apparent consumption.....	5,478,180		5,591,328	

(*) 1 barrel—350 pounds.

24315—16½

Table 342.—Production and Apparent Consumption of Cement in Canada, 1929-1939

Year	Sold or used		Apparent consumption
	Barrels	\$	Barrels
1929.....	12,284,081	19,337,235	12,105,950
1930.....	11,032,538	17,713,067	10,977,238
1931.....	10,161,658	15,826,243	10,085,986
1932.....	4,498,721	6,930,721	4,466,738
1933.....	3,007,432	4,536,935	2,974,020
1934.....	3,783,226	5,667,946	3,727,521
1935.....	3,648,086	5,580,043	3,610,217
1936.....	4,508,718	6,908,192	4,479,656
1937.....	6,168,971	9,095,867	6,157,485
1938.....	5,519,102	8,241,350	5,478,180
1939.....	5,731,264	8,511,211	5,591,328

Table 343.—Producers' Sales of Cement in Canada, by Provinces, 1937-1939

Province	1937		1938		1939	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	2,578,623	3,537,798	2,730,320	3,693,188	3,027,759	4,035,294
Ontario.....	2,650,652	3,657,067	1,818,032	2,555,214	1,709,263	2,437,777
Manitoba.....	328,518	745,736	330,889	754,427	343,717	773,363
Alberta.....	267,106	531,541	304,373	611,790	377,846	744,357
British Columbia.....	344,072	623,725	335,488	626,731	272,679	520,420
Canada.....	6,168,971	9,095,867	5,519,102	8,241,350	5,731,264	8,511,211

Table 344.—Kilns Used by the Canadian Cement Industry, 1932-1939

Year	Total daily capacity	
	Number	Barrels
1932.....	47	43,882
1933.....	41	43,622
1934.....	41	43,922
1935.....	20	32,650
1936.....	19	33,000
1937.....	18	33,900
1938.....	†21	35,200
1939.....	(a) 21	35,000

† 10 in use with a daily capacity of 23,100 barrels.

(a) 11 in use with a daily capacity of 23,700 barrels.

Table 345.—Specified Materials Used in Canadian Cement Plants, 1931-1939

Year	Shale	Limestone	Gypsum	Sand	Clay	Pyrites
	Tons	Tons	Tons	Tons	Tons	Tons
1931.....	(a)	2,489,147	56,677	(a)	(a)	(a)
1932.....	(a)	1,141,376	27,538	(a)	(a)	(a)
1933.....	(a)	616,364	13,319	(a)	(a)	(a)
1934.....	(a)	806,546	19,172	(a)	(a)	(a)
1935.....	(a)	818,443	21,611	5,047	(a)	(a)
1936.....	(a)	1,180,358	25,447	8,549	94,943	(a)
1937.....	(a)	1,465,168	33,691	9,281	195,877	444
1938.....	13,821	1,344,868	51,975	9,465	143,421	22
1939.....	27,241	1,379,858	31,492	7,942	105,982	16

(a) Data not recorded.

Table 346.—Principal Statistics of the Cement Manufacturing Industry in Canada, 1938-1939

	1938	1939
Number of firms.....	3	3
Number of plants.....	8	8
Capital employed..... \$	52,299,046	51,251,358
Number of employees—On salary.....	100	91
On wages.....	934	910
Total.....	1,034	1,001
Salaries and wages—Salaries..... \$	218,445	198,141
Wages..... \$	1,087,886	1,099,401
Total..... \$	1,306,331	1,297,542
Selling value of products (Gross)..... \$	8,241,350	8,511,211
Cost of fuel and electricity..... \$	1,764,427	1,705,981
Cost of process supplies (*)..... \$	529,157	532,058
Net value of products sold..... \$	5,947,766	6,273,172

(*) Other than fuel and electricity.

Table 347.—Capital Employed in the Cement Industry in Canada, 1939

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land.....	10,959,613
Present value of buildings, fixtures, machinery, tools and other equipment.....	34,172,573
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	904,245
Inventory value of finished products on hand.....	1,285,559
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	3,929,368
Total.....	51,251,358

Table 348.—Wage-earners on 15th of Each Month, or Nearest Representative Date, 1938 and 1939

Month	1938	1939	
		Quarry	Mill
January.....	843	55	719
February.....	860	56	743
March.....	888	82	738
April.....	957	120	796
May.....	1,060	128	915
June.....	1,018	130	932
July.....	939	140	897
August.....	956	144	922
September.....	1,033	134	898
October.....	1,035	105	852
November.....	916	65	698
December.....	711	58	592

Table 349.—World's Production of Cement, 1929, 1938 and 1939

(Taken from the Statistical Year-Book of the League of Nations)

NOTE.—This table covers, as far as possible, both natural and artificial (Portland, etc.) cements. Cement is made by burning a mixture of calcareous and argillaceous materials and grinding the resulting clinker. For natural cement, the mixture used is found as such in nature; for artificial cements, the constituents are mixed in the desired proportions.

(Metric tons—000's omitted)

Country	1929	1938	1939	Country	1929	1938	1939
Africa.....	760	1,600	1,700	U.S.S.R.....	2,367	5,696	.....
Algeria.....	58	.....	.....	Europe (*) (2).....	32,360	45,500	.....
Belgian Congo.....	60	25	35	Germany and Saar.....	7,206	15,600	.....
Egypt.....	180	376	372	Austria.....	582	650	.....
Morocco (French).....	65	165	.....	Belgium (4).....	3,248	2,911	.....
Mozambique.....	21	25	.....	Bulgaria.....	151	194	.....
Tunis.....	.....	69	.....	Denmark.....	799	640	696
Union of South Africa.....	(a) 376	878	949	Spain†.....	1,820	.....	.....
North America.....	34,426	19,161	22,101	Estonia.....	62	79	77
Canada.....	1,945	882	908	Finland.....	278	500	.....
United States.....	29,481	18,279	21,193	France.....	5,787	.....	.....
Mexico.....	225	374	400	Greece.....	155	308	.....
South America.....	(*) 800	2,594	2,600	Hungary.....	403	395	.....
Argentina.....	350	1,179	1,135	Italy.....	3,497	4,587	.....
Brazil.....	96	608	.....	Latvia.....	40	155	165
Chile.....	145	364	341	Norway.....	319	(*) 332	(*) 390
Colombia.....	.....	144	167	Netherlands.....	210	456	541
Peru.....	49	101	120	Poland.....	1,008	1,719	.....
Uruguay.....	.....	158	164	Portugal.....	88	268	297
Venezuela.....	.....	40	38	Romania.....	317	532	531
Asia (*).....	5,570	8,000	7,600	United Kingdom.....	4,766	7,900	.....
China.....	185	24	37	Sweden.....	570	993	.....
India.....	570	.....	.....	Czechoslovakia (*).....	1,250	.....	.....
Netherlands Indies.....	149	.....	.....	Turkey.....	65	287	284
French Indo-China.....	184	266	.....	Yugoslavia.....	874	712	663
Japan and Col.....	4,274	5,519	5,074	Oceania (*) (2).....	800	1,086	.....
Palestine.....	69	98	112	Australia (a).....	720	866	.....
Philippines.....	76	167	.....	New Zealand (b).....	.....	220	.....
Thailand.....	62	82	92	(*) Total.....	74,310	84,000	.....
Syria and Lebanon.....	.....	.....	.....	

(*) Estimate. (a) Twelve months ending June 30, 1940. (b) Twelve months ending March 31, 1940.

† Country not included in totals.

(1) China: total shipments from "Customs ports," excluding Manchuria.

(2) Europe, Oceania; total includes estimate for other countries not mentioned.

NOTE.—Most belligerent countries and certain neutral countries have forbidden publication of certain data, in whole or in part.

THE CEMENT PRODUCTS INDUSTRY

Production of manufactured cement products in Canada during 1939 was valued at \$3,716,692 compared with \$3,200,419 during 1938.

A total of 122 plants operated in this industry during 1939—there being 72 in Ontario, 27 in Quebec, 9 in British Columbia, 7 in Alberta, 1 in Nova Scotia, 3 in New Brunswick, 1 in Manitoba and 2 in Saskatchewan. Many of these works were quite small, there being 41 with outputs of less than \$5,000 each, while 62 were in the \$5,000 to \$50,000 group and only 19 were above \$50,000. The Ontario plants accounted for 51 per cent of the total production; establishments in Quebec contributed 34 per cent, and works in British Columbia accounted for more than 7 per cent, the remaining 8 per cent being distributed among New Brunswick, Nova Scotia, Manitoba, Saskatchewan and Alberta.

Products included ready-mixed concrete worth \$1,198,809, cement pipe of all kinds at \$481,095, hollow building blocks of cement at \$653,185, cinder blocks at \$240,012, artificial stone at \$149,644, cement blocks at \$76,186, and other items, such as, haydite blocks and slabs, laundry tubs, burial vaults, etc.

Data presented for this industry cover manufacturing only and do not include figures for the cement work done on the building of bridges, dams, foundations, etc.; this type of work has been covered in the annual survey of construction.

Table 351.—Products Made in the Cement Products Industry, by Provinces, 1939

Products	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Cement bricks.....	18,986	56,960		240	76,186
Cement hollow building blocks, etc.....	173,470	470,106	2,419	7,190	653,185
Cement drain pipe, sewer pipe, water pipe and culvert tile.....	172,470	139,365	111,470	57,790	481,095
Artificial stone.....	60,747	84,659	1,218	3,020	149,644
Cement laundry tubs.....	18	76,319	13,654		89,991
Cinder blocks.....	30,150	209,862			240,012
Cement stucco.....	305	14,438	7,526	200	22,469
Ready mixed concrete.....	558,614	331,523	112,341	196,331	1,198,809
All other products.....	233,656	499,603	36,569	35,473	805,301
Total.....	1,248,416	1,882,835	285,197	300,244	3,716,692

Table 352.—Materials Used in the Cement Products Industry, by Provinces, 1939

Material	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Portland cement.....	279,167	432,118	75,764	104,821	891,870
Quicklime.....	531	1,337	739	20	2,627
Sand.....	91,172	80,901	16,963	17,570	206,606
Gravel.....	1,279	48,586	12,010	31,020	92,895
Crushed stone.....	108,938	55,111	2,094	215	166,358
Cinders.....	7,668	26,000	10,649	11	44,328
Reinforcing steel.....	38,286	24,941		3,632	66,859
Other materials.....	31,956	156,641	18,518	1,445	208,560
Boxes, crates, lumber, etc.....	650	13,765	3,231	430	18,076
Total.....	559,647	839,400	139,968	159,164	1,698,179

THE CLAY AND CLAY PRODUCTS INDUSTRY

The Clay and Clay Products Industry in Canada is classified into two divisions: (1) production from domestic clays, which covers the manufacture from Canadian clays of refractories, building brick, structural tile, floor tile, roofing tile, drain tile, sewer pipe, and pottery, and (2) production from imported clays, which covers the manufacture of porcelain insulators, refractories, earthenware, pottery, ceramic floor and wall tile and other products from clays imported from other countries.

A total of 169 plants representing a total capital investment of \$22,602,563 operated in the domestic and imported clay products industries in Canada during 1939. These two industries provided employment for 3,262 persons during the year; their earnings totalled \$3,312,400. The combined production in 1939 was valued at \$8,123,215 compared with \$7,584,972 in 1938.

1. Production from Domestic Clays, 1939

The gross value of Canadian producers' sales of domestic clays and products made from same totalled \$5,151,236 in 1939 compared with \$4,536,084 in 1938 and \$13,904,643, the all-time high record established in 1929. Commercial production of domestic clay products in 1939 was reported from every province except Prince Edward Island; no output of these materials has as yet been recorded for the Yukon and Northwest Territories. Of the total value of sales in 1939, Ontario and Quebec firms contributed \$2,346,638 and \$1,274,776 respectively.

Sales of building brick in 1939 totalled 165,024 thousand, valued at \$2,676,634. Sewer pipe shipments aggregated \$813,208; hollow blocks, roofing and floor tile, \$734,488; drain tile, \$353,973 and pottery, including earthenware, \$280,420.

Fireclay was mined in Nova Scotia, Saskatchewan and British Columbia and sales of this material totalled 10,045 short tons valued at \$30,824. Firebrick made from Canadian clays in 1939 numbered 2,331 thousand worth \$119,346. Bentonite shipments during the year under review amounted to 988 short tons valued at \$3,441.

The number of firms reported as active in the Canadian domestic clay products industry totalled 141 in 1939, of which 82 were located in Ontario, 18 in Quebec, 11 in British Columbia, 10 in Alberta and the balance in Nova Scotia, New Brunswick, Saskatchewan and Manitoba. Capital employed by the industry as a whole was reported at \$17,940,742; employees numbered 2,165 and salaries and wages paid amounted to \$2,161,688. Fuel and electricity used during 1939 were appraised at \$998,683 and chemicals and various other process supplies consumed were valued at \$108,815.

Imports into Canada in 1939 of clay and its products, in all forms, were valued at \$7,934,630 compared with \$7,657,202 in 1938. Of the 1939 imports, \$3,610,781 came from the United Kingdom and \$3,887,187 from the United States. Exports in 1939 of Canadian clays and products made from Canadian clays were appraised at \$542,788 against \$546,005 in the preceding year.

The following information relating to Canadian clays is from a report prepared by the Bureau of Mines, Ottawa. . . . "Common clays suitable for the production of building brick and tile are found in all the provinces of Canada. The largest producing area in Canada of stoneware clays or semi-fireclays lies in the vicinity of Eastend and Willows in Saskatchewan; stoneware clays and moderately refractory fireclays occur near Shubenacadie and Musquodoboit, Nova Scotia. Stoneware clays, or low-grade fireclays, are also known to occur near Williams Lake, Quesnel and Chimney Creek Bridge in British Columbia; in the Cypress Hills of Alberta; and near Swan River, Manitoba. Fireclay refractories are manufactured from domestic clay at two large and a few small plants in Canada; near Vancouver, B.C., a high grade, moderately plastic fireclay is obtained by underground mining from the clay beds in the Sumas mountains. At another plant at Claybank, Saskatchewan, the highly plastic refractory clays recovered by selective mining from the "white mud" beds of Southern Saskatchewan are used. Small quantities of the most refractory clay in the deposits near Shubenacadie, N.S., are mined for refractory use and the Musquodoboit clay is utilized to some extent for the production of stove linings.

"China clay has been produced commercially in Canada only from the vicinity of St. Remi d'Amherst, Papineau county, Quebec. Important deposits of high-grade plastic white burning clays, and buff-burning clays, occur on the Mattagami, Abitibi, and Missinaibi Rivers in Northern Ontario; some may be classed as china clays, some as fireclays and others as ball clays. They have attracted considerable interest but have not yet been developed commercially, owing to their remoteness from industrial centres, and to a lack of transportation facilities. In British Columbia, along the Fraser River, about 25 miles above Prince George, is an extensive deposit of high-grade clay, parts of which yield a grade of china clay comparing favourably with the best found on this continent. Ball clays of high bond strength occur in the white mud beds of southern Saskatchewan".

In a summary review of the industry in 1939, L. H. Cole of the Bureau of Mines states "Few new developments occurred and a large proportion of ceramic products is still produced in Canada from imported raw materials. Progress was made at the plant of the Canadian China Clay Company at St. Remi d'Amherst, Amherst township, Papineau county, Quebec, and it is hoped to have the plant in production early in 1940 producing china clay and high-grade silica sand. The market for ball clays in Canada is not large but is growing, and there are also good prospects of developing a profitable export market for Canadian ball clays from deposits in Saskatchewan to the United States.

"Each year bentonite finds a wider variety of uses, dependent in large measure on the variable physical characteristics of the material. Bentonitic clays may be conveniently classed as (a) swelling and (b) non-swelling when wetted; the former find their principal use in foundry work as a bonding ingredient for moulding sand, for rejuvenating spent sand, and in core washes, as well as in pharmaceutical preparations and in many other products and processes. The non-swelling bentonites are used (chiefly in the activated form treatment with sulphuric acid) for bleaching in the petroleum and other industries, as well as in oil-well drilling, in which clay serves to stabilize the viscosity of the mud column, acting as a suspending medium for the barite or other heavy mineral used to weight the column against gas pressure, and to float up the drillings, as well as to seal the wall pores of the drill hole.

"Deposits of clay of the bentonitic character occur in Canada in the cretaceous beds of the Prairie Provinces, as well as in the tertiary beds of the Princeton-Merritt area in British Columbia. There was continued production from the deposits at and near Drumheller, Alberta, as well as small production from the British Columbia and Manitoba deposits. A deposit has been discovered near Rockglen, Saskatchewan, material from which has been processed through the laboratories of the University of Saskatchewan, at Saskatoon, and also of the National Research Council at Ottawa, and it is reported to be excellent. This deposit is now being examined with a view to production."

Table 353.—Production of Clay Products in Canada from Domestic Clays, by Provinces, 1930-1939 (Gross Values)

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1930.....	495,333	162,536	2,464,044	5,221,214	215,967	349,283	997,685	687,516	10,593,578
1931.....	467,126	143,348	2,360,908	3,552,800	122,628	166,257	529,716	498,505	7,841,288
1932.....	172,557	68,151	1,064,551	1,639,508	49,773	109,739	329,584	216,355	3,650,218
1933.....	125,500	46,917	580,088	1,024,579	20,966	92,207	198,373	174,205	2,262,835
1934.....	157,158	59,897	632,322	1,261,006	37,916	90,997	246,677	194,437	2,680,410
1935.....	270,478	62,478	593,162	1,370,225	74,755	98,150	326,679	216,636	3,012,563
1936.....	355,254	102,256	691,765	1,573,936	55,564	95,584	315,777	280,891	3,471,027
1937.....	406,846	123,876	1,053,153	2,033,845	95,531	115,330	338,638	349,640	4,516,859
1938.....	340,253	123,625	1,022,194	2,083,496	105,334	118,713	377,337	365,132	4,536,084
1939.....	339,952	129,985	1,274,776	2,346,638	78,892	148,774	461,079	371,140	5,151,236

Table 354.—Production (Sales) of Domestic Clay and Clay Products in Canada, 1938 and 1939

Products	Unit of measure	Sales or shipments			
		1938		1939	
		Quantity	\$	Quantity	\$
Clay—Fullers' earth.....	ton	.....	.....	.....	.....
Bentonite.....	ton	1,179	3,659	988	3,441
Fireclay.....	ton	2,344	17,243	10,045	30,824
Kaolin (china clay).....	ton	.....	.....	.....	.....
Other clay.....	ton	13,797	18,053	3,114	9,412
Fireclay blocks and shapes.....	\$	.....	73,512	.....	95,256
Firebrick.....	M	2,213	113,581	2,331	119,346
Brick—Soft mud process—Face.....	M	10,838	208,610	10,927	182,376
Common.....	M	24,104	313,082	26,652	372,116
Stiff mud process—Face.....	M	34,179	671,471	45,993	941,696
(wire cut) Common.....	M	50,734	681,744	51,114	692,224
Dry press—Face.....	M	13,125	266,039	12,263	242,518
Common.....	M	15,536	192,741	17,790	236,597
Fancy or ornamental brick (including special shapes, embossed and enamelled brick).....	M	63	4,175	68	4,601
Sewer brick.....	M	228	3,581	217	4,506
Paving brick.....	M	1	34	157	6,089
Structural tile—					
Hollow blocks (including fireproofing and load-bearing tile).....	ton	70,648	591,416	86,120	714,291
Roofing tile.....	No.	150,504	5,196	148,291	4,964
Floor tile (quarries).....	Sq. ft.	100,958	15,330	90,812	15,233
Ceramic or glazed floor and wall tile.....	\$	.....	.....	.....	.....
Drail tile.....	M	12,862	322,774	14,361	353,973
Sewer pipe (including copings, flue linings, etc.) (a).....	\$	.....	778,107	.....	813,208
Pottery, glazed or unglazed (including coarse earthenware, sanitary ware, stoneware, flower pots, and all other pottery).....	\$	.....	235,890	.....	282,712
Other products.....	\$	.....	19,846	.....	(b) 25,853
Total.....	\$	.....	4,536,084	.....	5,151,236

(a) Includes value of clay conduits.

(b) Includes crucibles.

NOTE.—In addition to the clays recorded in this table, there were 105,982 tons of ordinary clay consumed in Canada during 1939 in the production of Portland cement; the corresponding consumption in 1938 was 143,421 short tons. Also consumed by the Canadian cement industry in 1939 were 27,241 short tons of shale.

Table 355.—Production of Building Brick in Canada, 1929-1939

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1930.....	M	11,350	56,487	99,284	105,225	29,434	16,915	339	804	319,838
	\$	247,220	861,805	2,135,871	1,480,965	604,197	208,495	27,649	15,299	5,581,501
1931.....	M	5,476	41,177	77,135	81,930	20,149	8,688	335	2,253	237,143
	\$	116,316	619,357	1,752,947	1,205,464	423,357	107,213	20,773	43,692	4,289,119
1932.....	M	6,188	12,801	30,197	40,753	5,522	4,248	125	643	100,477
	\$	108,582	182,372	664,756	638,922	119,547	46,762	6,237	12,156	1,779,334
1933.....	M	2,482	12,389	19,602	23,894	4,544	3,916	630	243	67,700
	\$	41,737	156,769	412,367	356,498	101,252	44,377	7,824	3,693	1,124,517
1934.....	M	4,904	14,256	23,800	30,317	6,005	6,440	43	307	86,072
	\$	76,247	183,585	494,341	424,131	130,392	66,616	2,625	5,992	1,383,929
1935.....	M	6,695	21,197	25,289	32,334	8,454	6,381	13	175	100,538
	\$	122,215	259,504	500,066	437,123	175,042	55,253	728	5,236	1,555,167
1936.....	M	6,097	24,180	30,218	35,592	8,961	10,241	25	418	115,732
	\$	111,378	302,690	575,765	484,078	165,924	100,785	1,374	6,778	1,748,772
1937.....	M	9,904	23,636	37,610	55,689	12,565	14,136	55	175	153,770
	\$	175,544	316,534	735,615	755,630	233,542	152,662	2,972	2,777	2,375,276
1938.....	M	10,838	24,104	34,179	50,734	13,125	15,536	63	228	148,807
	\$	208,610	313,082	671,471	681,744	266,039	192,741	4,175	3,581	2,341,443
1939.....	M	10,927	26,652	45,993	51,114	12,263	17,790	68	217	165,024
	\$	182,376	372,116	941,696	692,224	242,518	236,597	4,601	4,506	2,676,634

Table 356.—Production of Building Brick in Canada—Per Capita of Population for Years Specified

Year	M per capita	Year	M per capita
1905.....	0.087	1934.....	0.008
1914.....	0.070	1935.....	0.009
1924.....	0.035	1936.....	0.010
1929.....	0.046	1937.....	0.014
1930.....	0.031	1938.....	0.013
1932.....	0.010	1939.....	0.015
1933.....	0.006		

Table 357.—Production of Paving Brick in Canada, 1930-1939

Year	Quantity M	Value \$
1930.....	9	297
1931.....	19	682
1932.....	6	155
1933.....	1	42
1934.....	10	382
1935.....	15	627
1936.....	116	3,149
1937.....	3	131
1938.....	1	34
1939.....	157	6,089

Table 358.—Production of Structural Tile in Canada, 1930-1939

Year	Hollow Blocks (*)		Roofing Tile		Floor Tile (Quarries)	
	Short tons	\$	No	\$	Sq. ft	\$
1930.....	165,359	1,667,783	3,056	356	179,786	56,230
1931.....	105,635	1,046,634	6,935	720	107,499	31,415
1932.....	48,118	421,672	48,939	3,900	94,316	21,502
1933.....	26,747	160,059	20,469	1,136	91,495	14,297
1934.....	31,136	244,122	44,115	1,852	80,356	17,491
1935.....	(a) 47,195	344,608	82,015	3,669	51,765	7,629
1936.....	58,501	467,860	52,730	2,139	97,738	13,798
1937.....	64,526	533,843	60,542	3,302	73,191	12,169
1938.....	70,648	591,416	150,504	5,196	100,958	15,330
1939.....	86,120	714,291	148,291	4,964	90,812	15,233

(*) Including fireproofing and load-bearing tile

(a) In addition, there was produced \$615 worth of ceramic tile.

Table 359.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1930-1939

Year	Value	Year	Value
	\$		\$
1930.....	1,721,815	1935.....	481,559
1931.....	1,508,803	1936.....	588,485
1932.....	813,224	1937.....	790,210
1933.....	354,458	1938.....	778,107
1934.....	436,433	1939.....	813,208

Table 360.—Production of Drain Tile in Canada, 1930-1939

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1930.....	25,291	687,070	1935.....	7,124	205,336
1931.....	12,518	328,410	1936.....	8,148	214,590
1932.....	7,385	186,670	1937.....	11,391	298,970
1933.....	10,057	222,829	1938.....	12,862	322,774
1934.....	7,325	180,553	1939.....	14,361	353,973

Table 361.—Production of Pottery† from Domestic Clays in Canada, 1930-1939

Year	Value	Year	Value
	\$		\$
1930.....	294,866	1935.....	220,711
1931.....	257,125	1936.....	218,402
1932.....	244,861	1937.....	232,209
1933.....	202,500	1938.....	235,890
1934.....	223,733	1939.....	*280,420

† Including coarse earthenware, stoneware, flower pots, and all other pottery.

* In addition \$2,292 worth of sanitaryware was produced.

Table 362.—Production of Kaolin* and Fireclay in Canada, 1930-1939

Year	Kaolin		Fireclay		Year	Kaolin		Fireclay	
	Quantity	Value	Quantity	Value		Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$		Tons	\$	Tons	\$
1930.....			2,870	25,975	1935.....	170	1,520	2,272	15,574
1931.....			1,233	14,857	1936.....			2,437	17,639
1932.....			990	11,826	1937.....			4,123	26,081
1933.....			1,421	11,273	1938.....			2,344	17,243
1934.....	48	504	1,043	12,598	1939.....			10,045	30,824

* Produced in province of Quebec.

Table 363.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1930-1939

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1930.....	3,789	177,608	147,309	1935.....	1,817	90,149	71,344
1931.....	2,248	107,597	83,039	1936.....	2,538	118,923	65,171
1932.....	1,580	71,757	75,209	1937.....	2,950	142,827	75,431
1933.....	1,547	73,226	80,625	1938.....	2,213	113,581	73,512
1934.....	2,109	101,219	62,388	1939.....	2,331	119,346	95,256

Table 364.—Production (Sales) of Bentonite in Canada, 1930-1939

Year	Bentonite (*)	
	Tons	\$
1930.....	74	1,396
1931.....	187	935
1932.....	7	176
1933.....	55	1,363
1934.....	63	1,578
1935.....	41	781
1936.....	(a) 120	180
1937.....	163	1,971
1938.....	1,179	3,659
1939.....	988	3,441

(*) All from British Columbia 1930-1936, inclusive; 1937 includes 132 tons at \$1,154 produced in Manitoba and 31 tons at \$817 in British Columbia. In 1938 Alberta production 1,136 tons, British Columbia 43 tons; in 1939 Manitoba 99 tons at \$591 and Alberta 889 tons at \$2,850.

(a) Partly for experimental purposes.

Table 365.—Fuller's Earth Used in Canada in the Manufacture of Soaps and Washing Compounds and in the Petroleum Products Industry, 1930-1939

Year	Petroleum Products Industry		Soaps and Washing Compounds	
	Pounds (*)	\$	Pounds	\$
1930.....	20,102,387	241,793	Data not available	
1931.....	16,157,582	201,361	492,174	6,264
1932.....	19,642,179	258,934	507,807	7,444
1933.....	22,811,655	314,515	588,434	8,501
1934.....	18,588,514	239,357	508,316	6,562
1935.....	18,487,148	260,885	660,018	13,694
1936.....	18,907,295	243,164	1,328,219	20,601
1937.....	18,843,458	240,309	1,167,768	20,393
1938.....	19,867,467	281,668	1,195,208	19,575
1939.....	19,814,473	304,214	1,586,163	30,924

(*) Includes all clay.

The United States Bureau of Mines reports that International trade in Fuller's earth is confined largely to the exports of American earth to mineral-oil refineries and of English earth to refineries treating edible oils and mineral fats. Experiments with bauxite began in 1937, for decolorizing oils by percolation processes and at least three companies in the United States are now offering it as a substitute for Fuller's earth.

With the opening up of new clay deposits, the use of the United States clays for treating edible products increased until 1938, when shipments to vegetable and animal oil refineries also decreased sharply, probably because of competition from artificially activated or acid-treated earths. Activated material is now made in California and Mississippi from bentonites having virtually no decolorizing power in the raw state.

Table 366.—China Clay (Kaolin) Used in the Manufacture of Paper in Canada, 1930-1939

Year	Tons	Value	Year	Tons	Value
		\$			\$
1930.....	13,024	218,423	1935.....	33,766	422,584
1931.....	11,484	173,660	1936.....	39,165	520,121
1932.....	14,432	205,068	1937.....	41,738	578,223
1933.....	20,048	267,014	1938.....	34,968	488,147
1934.....	27,550	357,286	1939.....	32,769	430,092

Table 367.—Clays and Earths Used in Canadian Rubber Industry, 1933-1938

Year	Tons	Value	Year	Tons	Value
		\$			\$
1933.....	1,391	32,361	1937.....	3,614	79,300
1934.....	2,391	54,368	1938.....	2,942	81,935
1935.....	2,639	63,553	1939.....	3,438	80,745
1936.....	3,017	70,709			

Table 368.—Fuller's and Infusorial Earth Used in Specified Canadian Industries, 1932-1939

Year	Sugar Refineries		Vegetable Oil Mills	
	Pounds	\$	Pounds	\$
1932.....	(a)	(a)	102,650	1,673
1933.....	(a)	(a)	126,880	2,730
1934.....	(a)	(a)	115,120	2,171
1935.....	(a)	(a)	88,980	2,425
1936.....	(b) 59,200	1,730	243,720	10,044
1937.....	(c) 4,586,786	95,532 (†)	212,997	9,349
1938.....	(c) 4,908,597	101,473	190,253	9,063
1939.....	(c) 4,819,811	105,711 (b)	207,105	10,166

(a) Not recorded. (b) Fullers' earth. (c) Infusorial earth. (†) Includes other earth.

NOTE.—In addition to the consumption recorded, there is a considerable quantity of Fullers' earth used in the slaughtering industry.

Table 369.—Firebrick and Fireclay Used in the Manufacture of Iron and Steel and Their Products in Canada, 1931-1939

Year	Firebrick		Fireclay		Other fireclay, firebrick and cupola blocks
	Number	Value	Number	Value	
		\$		\$	\$
1931.....	4,326,000	197,684	7,631	64,300	45,393
1932.....	3,409,000	123,532	5,910	52,492	36,395
1933.....	1,846,016	141,784	7,615	62,602	(b) 11,628
1934.....	2,590,452	192,538	8,248	75,906	21,488
1935.....	(a)	451,604	11,510	101,601	28,064
1936.....	(a)	(a)	(c) \$ 779,014	(a)	(a)
1937.....	(a)	(a)	(c) \$1,058,787	(a)	(a)
1938.....	(a)	(a)	(c) \$ 838,012	(a)	(a)
1939.....	(a)	(a)	(c) \$ 939,495	(a)	(a)

(a) Not published separately.

(b) From 1933 includes only cupola blocks.

(c) Combined value for firebricks, fireclay and other fireclay, etc.

Table 370.—Imports into Canada and Exports of Clay and Clay Products, 1938 and 1939

	Unit of measure	1938		1939	
		Quantity	\$	Quantity	\$
IMPORTS—					
Building brick.....	ton	1,801	22,075	1,908	27,236
Building blocks.....			48,310		30,098
Clays—China.....	cwt.	758,794	324,933	877,425	376,750
Fire.....	cwt.	1,083,493	181,221	1,060,786	162,925
Pipe.....			7,999		8,083
Other clays, n.o.p.....			203,587	(*)	192,521
Zirconium silicate.....			1,847		5,589
Zirconium oxide.....			24,983		40,096
Drain tile, unglazed.....			54		729
Drain, sewer pipe and earthenware fittings therefor, chimney linings or vents, chimeneý tops or inverted blocks, glazed or unglazed.....			12,950		15,768
Tiles or blocks of earthenware or stone prepared for mosaic flooring.....			53,223		56,209
Tiles, earthenware, for roofing purposes.....			3,152		10,731
Tiles, earthenware, n.o.p.....			131,990		123,689
Insulators, electric, porcelain.....			88,344		75,931
Pottery and chinaware.....			4,003,735		3,432,744
Firebrick, other, valued t not less than \$100 per M rectangular shaped; the dimensions of each not to exceed 125 cubic inches for use exclusively in the con- struction or repair of a furnace, kiln, etc.....			69,440		75,894
Firebrick, n.o.p. for use exclusively in the construction repair of a furnace, kiln, or other equipment of a manu- facturing establishment.....			321,850		494,396
Firebrick, n.o.p.....			666,359		841,071
Firebrick, chrome.....			47,885		88,367
Magnesite brick.....			571,910		677,011
Silica brick (containing not less than 90 per cent silica) ..			240,184		312,413
Paving brick.....	ton	1,695	12,798	816	6,801
Artificial teeth, not mounted.....			367,864		439,102
Baths, bath tubs, basins, laundry tubs, etc., of earthen- ware, cement or clay, n.o.p.....			119,164		147,976
Crucibles, clay or sand.....			29,139		40,259
Other manufactures of clay.....			62,526		95,957
Total.....			7,617,522		7,778,346
EXPORTS—					
Building brick.....	M	1,134	77,544	1,303	22,826
Clay—Unmanufactured.....	cwt.	919	2,652	1,427	2,065
Manufactured.....			53,104		65,046
Earthenware.....			15,808		14,919
Porcelain insulators.....			456,897		437,932
Total.....			606,005		542,788

(*) In addition, \$130,231 worth of activated clay was imported by oil refiners.

PRICES (a)

Bentomite—per ton, carload lots, f.o.b. Wyoming mines, dried and crushed, in bulk, \$8; in bags, \$10; f.o.b. Chicago, selected air-floated, \$25.

China Clay (Kaolin)—per ton, f.o.b. South Carolina and Georgia mines, in bulk: saggar clays, \$2.50 to \$3.50; tailings, \$4.50 to \$5.00. No. 2 grades, \$5.50 to \$6.00; No. 1 grades, air-floated, crude, \$6.75 to \$8.00; No. 1 washed, \$8.00. Florida: washed, crushed, \$11.75; air-floated and washed, \$14 to \$15. Maryland: ball clays, shredded bulk, \$3.75 to \$8.25; air-floated, in paper bags, \$15 to \$18.25. New Jersey: Plastic kaolin, pulverized, in paper bags, \$10. Insecticide clay, \$11.50 to \$16.50. Imported English, per long ton, C and F. American ports: lump, \$20.00 to \$25.00 in bulk; air-floated, \$35 to \$60.

Fuller's Earth—per ton, f.o.b. Colorado, \$9; f.o.b. Georgia or Florida, 30 to 60 mesh, \$14.50; 15 to 30, \$14; 200 and up, \$10; 100 and up \$7.

(b) **Fuller's Earth**—English, carlots, tons, to \$29.00; Georgian, carlots—to \$21.00.

(c) **China Clay**—Imported, carlots—bulk—ton \$20.00 to \$25.00. Pigment clay for rubber—carlots—bags—ton—\$20.00 to \$25.00, less carlots, to \$23. **Kaolin** (refined grades) lb. 4 cents–12 cents.

(a) Engineering and Mining Journal's "Metal and Mineral Markets"—New York, December, 1939.

(b) "Canadian Chemistry and Metallurgy"—Toronto, November, 1939.

(c) Engineering and Mining Journal's "Metal and Mineral Markets"—New York, August, 1940.

Table 371.—World's Production of China Clay, 1937, 1938 and 1939

(Taken from the Imperial Institute's publication—The Mineral Industry of the British Empire and Foreign Countries)

(Long tons)

Producing Country and Description	1937	1938	1939	Producing Country and Description	1937	1938	1939
BRITISH EMPIRE				FOREIGN COUNTRIES—Con.			
United Kingdom.....	830,946	585,888	910	Thuringia—			
Union of South Africa.....	413	798	910	San	6,392	(a)	
Burma.....	(a)	(a)		Greece.....	300	(a)	
Federated Malay States.....	263	385	493	Italy—			
India.....	17,081	26,106		Crude.....	96,094	73,772	
Unfederated Malay States..	30	768	1	Washed.....	37,159	43,630	
Australia.....	16,688	(a)		Portugal—			
				Washed.....			5,473
				Crude.....	10,723	11,768	8,406
				Kaolinic sand.....	453	189	228
				Roumania (e).....	600	490	
				Sweden.....	2,148	2,013	
				Algeria.....	1,634	(a)	
				United States (f).....	653,823	531,298	697,174
				Argentina.....	711	569	757
				Brazil.....	3,643	(a)	
				Chile.....	(a)	(a)	
				Japan (estimated).....	400,000	400,000	
				Korea.....	(a)	(a)	
				Manchuria.....	(a)	(a)	
				Netherlands East Indies..	771	2,657	2,766
FOREIGN COUNTRIES							
Austria.....	(b) 19,537	(d)					
Belgium (c).....	22,538	25,009					
Bulgaria.....	3,492	7,663					
Czechoslovakia (estimated)	450,000	400,000					
Denmark—							
Crude.....	32,300	37,400					
Washed and pressed.....	9,100	9,750					
France.....	124,450	140,400					
Germany—							
Bavaria.....	157,265	(a)					
Prussia.....	90,521	(a)					
Saxony.....							
Crude.....	47,653	(a)					
Washed.....	59,892	(a)					

China clay is also produced in U.S.S.R. and China.

(a) Information not available.

(c) "Eurite" and kaolin.

(e) Converted from cubic metres at the rate of 1 cubic metre = 2 long tons.

(b) Exports.

(d) Comparable exports not available.

(f) Sales of china clay and paper clay.

Table 372.—Sales and Cost Statistics, by Provinces, Domestic Clay Products Industry, 1935-1939

Province and Year	Number of firms	Cost of process supplies used	Cost of fuel and electricity	Net value of sales
		\$	\$	\$
NOVA SCOTIA—				
1935	5	906	50,264	219,308
1936	5	603	58,773	295,878
1937	5	2,514	73,200	331,132
1938	5	2,948	64,121	273,184
1939	6	3,270	62,994	273,688
NEW BRUNSWICK—				
1935	4	345	10,523	51,610
1936	5	480	20,652	81,124
1937	5	1,209	26,710	95,957
1938	5	2,069	25,409	96,147
1939	3	2,069	29,906	98,010
QUEBEC—				
1935	22	29,978	141,901	421,283
1936	19	15,967	169,803	505,995
1937	19	23,776	247,074	782,303
1938	19	33,030	235,148	754,016
1939	18	43,686	293,610	937,480
ONTARIO—				
1935	75	25,789	339,248	1,005,188
1936	80	46,924	357,874	1,169,138
1937	78	66,738	571,058	1,396,049
1938	84	66,691	493,118	1,523,687
1939	82	49,936	497,052	1,799,650
MANITOBA—				
1935	4	125	17,700	56,930
1936	4	667	8,813	46,084
1937	5	390	14,348	80,793
1938	4	460	23,278	81,596
1939	5	390	13,337	65,165
SASKATCHEWAN—				
1935	4	673	10,472	87,005
1936	3	776	11,429	83,379
1937	5	1,157	13,419	100,754
1938	6	824	10,882	107,007
1939	6	1,282	11,536	135,956
ALBERTA—				
1935	9	2,201	17,027	307,451
1936	9	3,533	27,973	284,271
1937	10	3,103	30,919	304,616
1938	10	2,267	25,891	349,179
1939	10	1,725	32,077	427,277
BRITISH COLUMBIA—				
1935	9	566	31,860	184,210
1936	8	2,403	39,684	238,804
1937	10	4,681	56,027	288,932
1938	12	6,370	61,343	297,419
1939	11	6,437	58,171	306,512
Canada—				
1935	132	60,583	618,995	2,332,985
1936	133	71,353	695,001	2,704,673
1937	137	103,568	1,032,755	3,330,536
1938	145	114,659	939,190	3,482,235
1939	141	108,815	998,683	4,043,738
1926	194	(a)	2,080,054	(a)

(a) Information not available.

Table 373.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1939

Industry and Province	Capital employed as represented by:					
	Present value of land†	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$
By INDUSTRIES—						
*Brick and Tile—						
Nova Scotia.....	116,991	598,321	72,683	88,927	56,786	933,708
New Brunswick.....	125,248	46,598	15,772	9,318	15,714	212,650
Quebec.....	645,897	2,860,055	66,406	356,783	378,015	4,307,156
Ontario.....	1,421,340	4,506,744	119,546	769,106	1,398,717	8,215,453
Manitoba.....	15,550	139,711	3,443	31,053	76,119	265,876
Saskatchewan.....	272,967	420,919	16,707	35,672	72,624	818,889
Alberta.....	187,341	1,457,904	74,214	150,809	92,243	1,962,511
British Columbia.....	144,182	490,866	11,228	148,931	102,857	898,064
Total for Canada.....	2,929,516	10,521,118	379,999	1,590,599	2,193,075	17,614,307
Stoneware and pottery—						
Total for Canada.....	40,478	156,581	27,513	29,280	72,583	326,435
By PROVINCES—						
Total for clay and clay products—						
Nova Scotia.....	116,991	598,321	72,683	88,927	56,786	933,708
New Brunswick.....	126,248	53,935	26,362	9,318	30,065	245,928
Quebec.....	645,897	2,860,055	66,406	356,783	378,015	4,307,156
Ontario.....	1,437,940	4,539,060	122,705	778,522	1,425,353	8,303,580
Manitoba.....	15,550	139,711	3,443	31,053	76,119	265,876
Saskatchewan.....	272,967	420,919	16,707	35,672	72,624	818,889
Alberta.....	209,519	1,566,385	87,703	167,031	122,839	2,153,477
British Columbia.....	144,882	499,313	11,503	152,573	103,857	912,128
Canada.....	2,969,994	10,677,699	407,512	1,619,879	2,265,658	17,940,742

* Clay, sewer pipe, firebrick products and other clays included under brick and tile.

† Excluding unmined material.

Table 374.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1939

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....	16	126	142	35,158	94,712	129,870
New Brunswick.....	4	60	64	5,075	41,281	46,356
Quebec.....	60	438	498	127,625	375,855	503,480
Ontario.....	114	770	884	222,129	708,088	930,217
Manitoba.....	6	57	63	16,300	30,480	46,780
Saskatchewan.....	8	33	41	16,465	39,309	55,774
Alberta.....	33	230	263	65,246	183,835	249,081
British Columbia.....	20	190	210	38,962	161,168	200,130
Canada.....	†261	1,904	2,165	526,960	1,634,728	2,161,688

* See note, page 30.

† Includes 27 female salaried workers.

Table 375.—Average Number of Wage-earners, by Months, 1938-1939

Month	1938	1939	
		Pit	Plant
January.....	893	46	792
February.....	823	31	712
March.....	941	57	933
April.....	1,561	81	1,277
May.....	2,567	285	2,001
June.....	2,940	415	2,326
July.....	2,837	441	2,438
August.....	2,638	369	2,392
September.....	2,553	275	2,153
October.....	2,179	160	1,887
November.....	1,837	143	1,832
December.....	1,501	102	1,470

2. Products from Imported Clays

This industry covers the operations of Canadian plants which were occupied chiefly in making ceramic products from imported clays. Products made in these plants during 1939 included high tension insulators, vitreous china sanitaryware, china dinnerware, firebrick, sewer pipe, floor and wall tile, refractory cements, electrical porcelains, etc.

Twenty plants reported in this group for 1939 and their output was valued at \$2,971,979, against last year's total of \$3,048,888 and the 1937 figure of \$3,599,181. Capital employed amounted to \$4,661,821. The average number of workers was 1,097 and payments for salaries and wages totalled \$1,150,712. Fuel and electricity cost \$237,718 and materials for use in manufacturing processes cost \$792,767.

Table 376.—Products Made in the Imported-Clay Products Industry, 1938 and 1939

Products	1938	1939
	Gross selling value at works	Gross selling value at works
Firebrick and stove linings—Rigid.....	\$ 271,711	\$ 403,893
Plastic.....	83,736	83,095
High temperature cements.....	36,040	36,280
High tension porcelain insulators, china sanitaryware, clay sewer pipe, floor and wall tile, pottery, china tableware, etc.....	2,657,401	2,448,711
(Separate figures cannot be shown for these items as there were only one or two producers in each case).		
Total.....	3,048,888	2,971,979

NOTE.—Clay firebrick, floor tile, sewer pipe and pottery are also made in Canada from domestic clays. High temperature cements and refractory bricks are made also by concerns in other industries.

Table 377.—Materials Used in the Imported-Clay Products Industry, 1938 and 1939

Material	1938		1939	
	Short tons	Total cost at works	Short tons	Total cost at works
Imported clays—Ball clay.....	2,531	\$ 46,766	2,970	\$ 48,994
China clay.....	2,573	52,927	2,973	51,427
Fireclay.....	20,717	118,875	21,721	127,663
Saggar clay.....	462	4,376	453	4,909
Other imported clays.....	640	7,517	1,125	18,000
Canadian clays—Fireclay.....	202	1,879	192	1,722
Other clays.....	3,491	2,699	95	645
Feldspar.....	1,890	35,979	2,021	38,840
Silica and ground quartz.....	2,576	38,441	1,968	27,161
Talc.....	160	2,119	178	2,502
Other glazing materials.....		15,793		25,796
Insulator hardware.....		219,367		206,221
Shipping containers and packing materials.....		75,186		100,155
All other materials.....		174,032		138,732
Total.....		795,956		792,767

LIME

Production of quick and hydrated lime in Canada during 1939 totalled 552,209 short tons valued at \$4,003,514 compared with 486,922 short tons at \$3,542,652 in 1938. The 1939 output comprised 474,753 short tons of quick lime valued at \$3,326,647 and 77,456 short tons of hydrated lime worth \$676,867. During the year under review, 424,287 tons of quick lime and 30,861 tons of hydrated lime were sold or used by lime producers for chemical purposes while the balance of Canadian lime production, totalling 97,061 tons and consisting of both quick and hydrated was sold or used for building, agricultural and other purposes.

Stone used in the production of lime in Canada included calcium, high calcium and dolomitic varieties of limestone. It is estimated that more than 900,000 tons of limestone was used in the production of lime in 1939. Lime was produced in all Canadian provinces in 1939 with the exception of Prince Edward Island and Saskatchewan; no commercial production was reported in the Territories. Of the total Canadian output of lime in 1939, Ontario plants produced 302,259 tons or 54.7 per cent and Quebec 161,112 tons or 29.2 per cent. Imports of lime into Canada in 1939 came entirely from the United States and totalled 6,058 short tons valued at \$33,342; exports of lime during the same period amounted to 9,209 tons at \$75,172.

During 1939 the industry reported 59 plants as active, capital employed totalled \$4,802,983 and \$849,468 in salaries and wages were distributed to 937 employees. The cost of fuels and purchased electricity used amounted to \$944,502 and the value of explosives, chemicals and other process supplies consumed aggregated \$107,510.

The following information relating to lime production is from a report prepared recently by M. F. Goudge of the Department of Mines and Resources, Ottawa:

"Lime and limestone find important applications in the metallurgy of nickel, lead, copper, chromium, zinc, tin, gold, silver, antimony, cobalt, molybdenum and other metals; the lime is used principally as a reagent in flotation, cyanidation and amalgamation processes. Pulverized limestone (and lime) is spread on acid farm land to sweeten the soil. Lime plays a part in the preparation of many food products, such as, baking powder and baking soda, gelatin, glucose, dextrin and saccharine. It is also used in the manufacture of citric, tartaric and other organic acids. Lime and limestone find applications in the making of building brick and pottery, silica brick and sand-lime brick. Lime is a valuable enamel constituent in that it increases the opacity of the enamel. In the lime industry noteworthy developments are occurring. Until recent years, there was only a very small market for carbon dioxide and the gas evolved during calcination of limestone had been allowed to go to waste. With increasing demand for carbon dioxide for use as a refrigerant, as an explosive, in chemical processes, in carbonated beverages, etc., ways and means of recovering carbon dioxide from lime kilns have been devised, and it is now being marketed in solid and liquid forms from one lime plant in Australia and from another in the United States. Equipment is also in use in several places for recovering carbon dioxide from dolomite, leaving lime as a by-product. If the recovery of carbon dioxide becomes a more general practice, as would seem likely, it would probably tend to decrease the cost of making lime, which, in turn, would encourage its greater utilization.

"A large new market for white, high-calcium lime has been created by the use of calcium carbonate filler in place of imported clay in newsprint and magazine paper. Its manufacture in Canada was begun in 1937. At present the paper companies using it purchase the quicklime and make the carbonate filler at their own plants.

"During 1939 Gypsum, Lime and Alabastine, Canada, Limited, erected new vertical, gas fired lime kilns equipped with centre burners at their plants at Beachville, Ontario and at St. Marc des Carrières, Quebec. These kilns, which are claimed to be the most modern shaft kilns on the American continent, have proved very efficient in operation and represent a notable advance in the technology of manufacturing lime in vertical kilns.

"Lime is marketed in the form of quicklime and in the hydrated state, the latter being a specially prepared slaked lime in the form of a fine powder that is marketed in 50-pound, multi-wall paper bags.

"Quicklime is marketed in the lump, pebble, crushed and pulverized forms; lump lime and pebble lime are sold either in bulk or packed in barrels; crushed lime (1 inch and under) and pulverized lime (ground to minus 20 mesh, and in some plants to minus 50 mesh) are sold in airtight multi-wall paper bags.

"A new chemical use for lime is in the manufacture of a new plastic from pulp-mill waste liquor that promises to be one of the cheapest of all plastics; lime is used three times in the process.

"Prices of the various lime products vary over a wide range depending on the geographical position of the plants and on differences in quality of the lime."

Table 378.—Production of Lime in Canada, 1930-1939

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1930.....	490,802	4,038,698	1935.....	405,419	2,925,791
1931.....	344,785	2,764,415	1936.....	468,401	3,335,970
1932.....	320,650	2,394,537	1937.....	549,353	3,824,917
1933.....	323,540	2,432,306	1938.....	486,922	3,542,652
1934.....	368,113	2,745,797	1939.....	552,209	4,003,514

Table 379.—Production of Lime in Canada, by Provinces, 1939, Showing Purposes for which Used* or Sold

	Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
(1 ton = 2,000 pounds)						
QUICKLIME						
Building trades—						
Finishing lime..... ton		35	2,965	2,557	308	5,865
\$		475	21,455	22,984	4,446	49,360
Masons' lime..... ton	2,450	7,312	6,297	929		16,988
\$	21,940	68,254	50,265	6,832		147,291
Sand-lime brick..... ton		1,555	5,910			7,465
\$		7,218	37,900			45,118
Agriculture..... ton	210	5	10		118	343
\$	2,290	48	30		590	2,953
CHEMICAL—						
Smelters (non ferrous)..... ton			603	1,509	62	2,174
\$			3,490	15,090	820	19,200
Iron and steel furnaces (a)..... ton	16,054	996	17,877		759	35,686
\$	139,439	7,717	127,177		7,587	281,920
Cyanide mills (gold mines)..... ton	25	5,197	15,817	4,877	806	26,722
\$	250	38,082	96,171	39,962	8,056	182,521
Pulp and paper mills..... ton	6,928	77,252	5,405	7,477	8,353	105,415
\$	55,984	412,515	36,172	49,240	67,487	621,398
Glass works..... ton			7,775	524		8,299
\$			51,550	4,199		55,749
Sugar refineries..... ton	200	33	7,783	8,075	608	16,699
\$	1,700	316	69,694	66,990	6,076	144,776
Tanneries..... ton		825	3,194			4,019
\$		5,777	20,716			26,493
Fertilizer plants..... ton			109			109
\$			763			763
Insecticide plants..... ton			1,034		87	1,121
\$			7,221		869	8,090
Other chemical works..... ton	160	34,176	189,460	247		224,043
\$	1,450	236,241	1,306,262	2,381		1,546,334
Uses unspecified..... ton		798	3,650	1,543	6,934	12,905
\$		9,786	33,755	16,790	69,305	129,637
Other consumers..... ton		6,147	753			6,900
\$		57,626	7,413			65,039
Total quicklime..... ton	26,027	134,331	268,622	27,738	18,035	474,753
\$	223,053	844,055	1,870,035	224,468	165,036	3,326,647
HYDRATED LIME						
Building trades—						
Finishing lime..... ton	80		18,165	4,523		22,768
\$	830		208,870	76,456		286,156
Masons' lime..... ton	1,083	721	7,605			9,409
\$	9,024	10,213	65,135			84,372
Sand-lime brick..... ton						
\$						
Agriculture..... ton	1,664	766	2,629		2,841	7,900
\$	14,470	7,610	26,837		19,009	67,926

Table 379.—Production of Lime in Canada, by Provinces, 1939, Showing Purposes for which Used* or Sold—Concluded

	Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
(1 ton = 2,000 pounds)						
HYDRATED LIME—Concluded						
CHEMICAL—						
Smelters (non-ferrous).....ton		14,236	18	20	873	15,147
\$		42,878	173	200	5,841	49,092
Iron and steel furnaces.....ton			73			73
\$			697			697
Cyanide mills.....ton		1,090	383	20		1,493
\$		5,450	4,234	200		9,884
Pulp and paper mills.....ton	4,300	5,868	101			10,269
\$	30,750	41,297	1,113			73,160
Glass works.....ton						
\$						
Sugar refineries.....ton	20	126	88		25	259
\$	180	1,071	928		167	2,346
Tanneries.....ton		485	413			898
\$		3,413	4,421			7,834
Fertilizer plants.....ton		195				195
\$		1,170				1,170
Insecticide plants.....ton	282	300			44	626
\$	3,102	2,400			294	5,796
Other chemical works.....ton			1,671	230		1,901
\$			18,585	3,498		22,083
Uses unspecified.....ton		468	2,224		1,033	3,725
\$		3,749	32,324		6,912	42,985
Other consumers.....ton		2,526	267			2,793
\$		19,766	3,600			23,366
Total hydrated lime.....ton	7,429	26,781	33,637	4,793	4,816	77,456
\$	58,356	139,017	366,917	80,354	32,223	676,867
Grand total.....ton	33,456	161,112	302,259	32,531	22,851	552,209
\$	281,409	983,072	2,236,952	304,822	197,259	4,003,514

(a) Includes calcined dolomite used as a refractory material.

(*) Not necessarily consumed in provinces where produced.

NOTE.—Of the total quantity of 552,209 tons of lime produced, 263,957 tons were consumed by the producers themselves. Canadian municipal waterworks consumed 1,169,853 pounds of lime in 1939.

Table 381.—Lime Sold or Used for Chemical and Other Purposes and Value of Contracts in Canada, 1930-1939.

Year	Lime sold or used for chemical purposes		Lime sold or used for building or other non- chemical purposes		Value of construction contracts awarded in Canada (a)
	Short tons	\$	Short tons	\$	\$
1930.....	351,443	2,596,112	139,359	1,442,586	456,999,600
1931.....	231,837	1,637,319	112,948	1,127,098	315,482,000
1932.....	255,472	1,758,898	65,178	635,639	132,872,400
1933.....	235,810	1,664,946	87,730	767,360	97,289,800
1934.....	229,906	1,598,906	138,207	1,146,891	125,811,500
1935.....	260,885	1,775,657	144,534	1,150,134	160,305,000
1936.....	(b) 389,324	2,670,266	79,077	665,704	162,588,000
1937.....	(c) 466,796	3,112,147	82,557	712,770	224,056,700
1938.....	(d) 403,825	2,746,927	83,097	795,725	187,277,900
1939.....	(e) 455,148	3,059,306	97,061	944,208	187,178,500

(a) Compiled by McLean Building Reports Ltd.

(b) 349,940 short tons quicklime; 39,384 short tons hydrated lime.

(c) 421,867 tons quicklime and 44,929 short tons hydrated lime.

(d) 373,278 tons quicklime and 30,547 short tons hydrated lime.

(e) 424,287 tons quicklime and 30,861 tons hydrated lime.

Table 382.—Imports into Canada and Exports of Lime and Various Lime Compounds, 1938 and 1939

	1938		1939	
	Quantity	Value	Quantity	Value
		\$		\$
IMPORTS—				
Lime.....cwt.	(a) 133,050	36,248	(a) 121,170	33,342
Calcium chloride in packages of not less than 25 pounds.....lb.	383,900	4,121	239,200	2,866
Calcium chloride in packages of less than 25 pounds.....lb.	1,263	185	229	69
Calcium chloride not in solution for road treating purposes.....lb.	15,283,100	148,581	11,181,600	104,578
Calcium arsenate.....lb.	37,068	3,507	389,557	23,643
Chloride of lime and hypochlorite of lime in packages not less than 25 pounds.....lb.	345,100	22,566	400,800	26,550
Chloride of lime and hypochlorite of lime in packages of less than 25 pounds.....lb.	39,280	4,726	32,986	5,127
EXPORTS—				
Lime.....cwt.	127,615	51,346	184,184	75,172
Acetate of lime.....cwt.	41,208	44,910	40,972	58,391

(a) All from the United States.

Table 383.—Number of Firms, Employees, Salaries and Wages and Net Value of Lime (Quick and Hydrated) Sold or Used, by Provinces, 1939

Province	Number of firms	Number of employees		Salaries and wages	Fuel, electricity and process supplies used	Production Net value
		Salaried employees	Wage-earners			
				\$	\$	\$
New Brunswick (†).....	6	7	102	109,925	63,428	217,981
Quebec.....	20	27	319	278,523	392,136	590,936
Ontario.....	19	30	224	276,077	483,428	1,753,524
Manitoba.....	3	6	79	67,509	72,151	124,039
Alberta.....	3	4	21	29,031	20,559	88,073
British Columbia.....	3	11	107	88,403	20,310	176,949
Canada.....	54	85	852	849,468	1,052,012	2,951,502

(†) Includes data for two firms operating in Nova Scotia.

Table 384.—Capital Employed in the Lime Industry in Canada, by Provinces, 1939

Province	Capital employed as represented by:					Total
	Present cash value of land	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of stone on hand, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	
	\$	\$	\$	\$	\$	\$
New Brunswick (*).....	25,500	111,500	9,900	5,100	43,600	195,600
Quebec.....	54,665	621,267	144,920	11,488	223,998	1,056,335
Ontario.....	139,218	2,054,690	220,664	12,281	30,638	2,457,491
Manitoba.....	(a)	484,500	31,569	11,855	.....	527,924
Alberta.....	2,500	133,175	6,020	5,800	24,364	171,859
British Columbia.....	5,000	237,032	68,319	10,748	72,672	393,771
Canada.....	226,883	3,642,164	481,392	57,272	395,272	4,802,983

* Includes data for 2 firms in Nova Scotia.

(a) Not recorded.

Table 385.—Number of Wage-earners on Payroll or Time Record on the 15th of Each Month or Nearest Representative Date, 1939

Month	Quarry	Kiln	Month	Quarry	Kiln
January.....	274	450	July.....	362	539
February.....	252	449	August.....	369	538
March.....	300	489	September.....	359	549
April.....	340	492	October.....	351	585
May.....	366	539	November.....	347	539
June.....	370	522	December.....	310	471

SAND-LIME BRICK INDUSTRY

Four plants in Ontario and one in Quebec manufactured sand-lime building brick during 1939. The value of their production, including building blocks and bricks, was \$212,223 compared with \$153,763 in 1938.

These five plants had a capital investment in Canada of \$382,745 as represented by the value of lands, buildings, machinery, inventories and accounts receivable. They employed an average of 74 persons monthly who received \$73,885 in salaries and wages; spent \$19,587 for fuel and electricity and paid \$66,187 for the materials used in manufacturing processes.

Output of sand-lime brick amounted to 11,805 M valued at \$133,168, an increase in both quantity and value from the 8,774 M brick at \$99,573 in the previous year. Production of sand-lime building blocks also increased to \$67,407 from \$37,660.

Table 386.—Products, 1938 and 1939

Products	1938		1939	
	Quantity	Selling value at works	Quantity	Selling value at works
		\$		\$
Sand-lime brick.....M	8,774	99,573	11,805	133,168
Sand-lime building blocks.....M	373	37,660	.....	67,407
Other products (*).....	.....	16,530	.....	11,648
Total.....	.....	153,763	.....	212,223

(*) Includes some cinder blocks.

Table 387.—Materials Used in Manufacturing, 1938 and 1939

Materials	Unit of measure	1938		1939	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Quicklime.....	ton	3,956	28,954	4,192	31,303
Sand.....	cu. yd.	18,777	20,133	24,639	25,601
Other materials.....	.....	.....	3,789	.....	9,283
Total.....	.....	.....	52,876	.....	66,187

THE SAND AND GRAVEL INDUSTRY

Commercial production of sand and gravel in Canada during 1939 totalled 31,294,341 short tons valued at \$11,241,102 compared with the all-time high record of 32,223,882 short tons at \$12,002,554 in 1938. In the totals for both 1939 and the preceding year are sands and gravels derived from all sources, including recoveries by dredges and material used by railroads as ballast.

Quebec and Ontario are Canada's largest sand and gravel producing provinces, the output in these provinces in 1939 being, respectively, 10,050,985 short tons and 9,350,875 short tons; in 1939, the quantity of material washed or screened at Canadian sand and gravel plants totalled 2,754,122 short tons compared with 2,949,360 short tons in 1938, while the quantity of bank and pit-run grades amounted to 28,540,219 short tons as against a corresponding tonnage of 29,274,522 in the preceding year.

Of the total sand and gravel output in 1939, there were 22,899,751 short tons for concrete, roads, etc., and 3,223,718 tons as railway ballast. In addition, there were produced 1,169,899 tons of straight sand for building, etc.; 17,618 tons for moulding; 1,541 tons as core sand and 53,478 tons for other purposes. The quantity of crushed gravel produced during the year under review amounted to 2,475,343 tons and 1,452,993 tons of sand were employed as mine fill.

Imports of sand and gravel, n.o.p., into Canada in 1939 totalled 148,254 short tons appraised at \$69,354 compared with 86,692 tons worth \$62,485 in 1938; exports of these materials in 1939 amounted to 242,111 tons valued at \$79,415 as against corresponding exports of 609,193 short tons at \$146,050 in 1938.

Firms reported as active in the Canadian sand and gravel industry numbered 1,403 in 1939; of these, 886 were located in Quebec, 434 in Ontario, 26 in British Columbia and lesser numbers in Nova Scotia, New Brunswick, Manitoba, Saskatchewan and Alberta. Capital employed by the industry totalled \$2,735,690; employees were reported at 6,120; salaries and wages paid totalled \$3,981,913; fuel, electricity and process supplies used aggregated \$274,509 and the total net value of production was estimated at \$10,966,593.

The Bureau of Mines, Ottawa, reports that most of the gravel used for road work comes from pits that are worked for that purpose. Usually enough gravel is extracted by a portable or semi-portable plant to supply the immediate needs, following which a sufficient reserve is built up, in the form of stock piles for two years' requirements. Thus, the output of gravel from year to year depends upon the extent of road construction and improvements. Railway pits may also remain idle for several years. Part of the gravel is crushed, screened, and in some cases even washed. Some of the provincial highway departments have been using crushed instead of pit-run gravel on their main highways for a number of years. Most of the large commercial plants are equipped to produce crushed gravel, a product that can compete with crushed stone. Sand is used chiefly in the building industry, for which purpose it must be free from dust, loam, organic matter or clay, and contain but little silt. It is usually obtained from local deposits. Special grades of sand are used in foundries for moulding, in the filtering of water supply, and in glass making.

Table 388.—Production* of Sand and Gravel in Canada, 1930-1939

Year	Tons	\$	Year	Tons	\$
1930.....	28,547,511	8,344,913	1935.....	21,213,489	6,389,440
1931.....	21,748,586	6,651,165	1936.....	22,124,160	6,921,399
1932.....	14,469,942	4,480,596	1937.....	27,001,301	10,492,696
1933.....	11,738,823	4,464,285	1938.....	32,223,882	12,002,554
1934.....	14,854,159	4,035,477	1939.....	31,294,341	11,241,102

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these are recorded under quartz. Also does not include natural sand used for back filling at mines prior to 1936.

Table 389.—Production in Canada, Imports and Exports of Sand and Gravel, 1939

	Washed or screened	Bank or pit-run	Total value
	Tons	Tons	\$
PRODUCTION (*)—			
Sand—			
Moulding sand.....	6,410	11,208	18,652
Building sand and sand for concrete, roadwork, etc.....	594,336	575,563	364,829
Core sand.....	1,404	137	2,122
Mine filling.....		1,452,993	194,332
Other sand (including blast sands, engine sands, etc.).....	14,251	39,227	13,425
Sand and gravel—			
Sand and gravel for railway ballast.....	318,262	2,905,456	603,288
Sand and gravel for concrete, roadbuilding, etc.....	1,487,619	21,412,132	8,988,114
Crushed gravel.....	331,840	2,143,503	1,056,340
Total.....	2,754,122	28,540,219	11,241,102
Cost of fuel, electricity and process supplies used.....			274,509
Total net value.....			10,966,593
	Tons	\$	
IMPORTS—			
Sand, silica, for glass and carborundum manufacture, etc.....	167,721	349,256	
Sand and gravel, n.o.p.....	148,254	69,354	
Silex or crystallized quartz, ground or unground.....	2,750	61,497	
Gamister.....	255	2,018	
Total.....		482,125	
EXPORTS—			
Sand and gravel.....	242,111	79,415	

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these is recorded under quartz.

Table 390.—Production of Sand and Gravel in Canada, by Railway Operators, 1938 and 1939

Kind	1938		1939	
	Tons	Value	Tons	Value
		\$		\$
Sand—				
Moulding sand.....	81	135	120	180
Building sand and sand for concrete, roads, etc.....				
Other sand (including blast and engine sands).....	41,638	7,346	35,761	5,350
Sand and gravel—				
Sand and gravel for railway ballast.....	2,013,551	313,411	2,812,315	449,366
Sand and gravel for concrete, roads, etc.....	261,068	47,290	77,895	13,991
Crushed gravel.....				
Total.....	2,316,338	363,182	2,926,091	468,887

Table 391.—Production of Sand and Gravel in Canada, by Operators, Other than Railways, 1938-1939

Kind	1938			1939		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
	Tons	Tons	\$	Tons	Tons	\$
Sand—						
Moulding sand.....	8,434	10,330	19,563	6,410	11,088	18,472
Building sand and sand for concrete, roads, etc.....	1,038,859	711,328	685,976	594,336	575,563	364,829
Core sand.....	4,528	128	5,612	1,404	137	2,122
Other sand (including blast, and engine sands).....	12,885	8,416	9,951	14,251	3,466	8,075
Sand and gravel—						
Sand and gravel for railway ballast.....	246,485	99,667	130,525	318,262	93,141	153,922
Sand and gravel for concrete, roads, etc.....	1,312,136	20,940,052	9,054,592	1,487,619	21,334,237	8,974,123
Mine filling.....		1,852,323	256,380		1,452,993	194,332
Crushed gravel.....	326,033	3,335,940	1,471,773	331,840	2,143,503	1,056,340
Total.....	2,949,360	26,958,184	11,634,372	2,754,122	25,614,128	10,772,215

Table 392.—Production of Sand for Building and Concrete, Roads, Etc., and Sand and Gravel for Railway Ballast and for Concrete, Roads, Etc., 1931-1939

Year	Sand		Sand and gravel			
	For building, concrete, roads, etc.		For railway ballast		For concrete, roads, etc.	
	Tons	\$	Tons	\$	Tons	\$
1931.....	3,189,428	1,069,210	3,593,451	459,531	14,352,283	4,784,298
1932.....	2,368,304	745,091	2,097,224	324,648	9,604,113	3,181,105
1933.....	775,412	218,559	561,538	110,449	9,957,832	3,907,911
1934.....	686,631	209,002	1,454,618	266,292	12,418,408	3,411,751
1935.....	787,412	264,435	2,267,195	415,092	17,531,047	5,357,331
1936.....	956,502	362,542	6,318,681	1,054,703	14,336,640	5,216,942
1937.....	1,356,269	476,824	2,764,639	533,876	19,453,188	8,340,764
1938.....	1,750,187	685,976	2,359,703	443,936	22,513,256	9,101,882
1939						
Nova Scotia.....			135,866	21,600	2,002,724	1,202,170
New Brunswick.....	11,475	1,700	219,407	33,278	3,012,812	1,256,050
Quebec.....	794,566	239,690	536,267	94,021	6,714,880	1,591,417
Ontario.....	263,345	87,665	1,507,785	316,620	6,113,352	2,757,967
Manitoba.....	14,042	5,376	143,991	24,056	1,171,351	471,958
Saskatchewan.....	9,505	2,631	327,438	48,615	1,545,130	350,769
Alberta.....	9,547	7,766	228,929	42,198	574,739	568,541
British Columbia.....	67,419	20,001	124,035	22,900	1,764,763	789,242
Canada.....	1,169,899	364,829	3,223,718	603,288	22,899,751	8,988,114

Table 393.—Production of Sand and Gravel in Canada, by Provinces, 1939

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Sand—								
Moulding sand..... tons	837			16,225	507	17	27	5
\$	2,057			16,033	467	50	20	25
Building sand and sand for concrete, roadwork, etc..... tons		11,475	794,566	263,345	14,042	9,505	9,547	67,419
\$		1,700	239,690	87,665	5,376	2,631	7,766	20,001
Core sand..... tons				1,404	136	1		
\$				1,990	122	10		
Other sand (including blast sand, engine sand, etc.)..... tons			10,330	16,714		18,905	3,926	3,603
\$			4,259	6,222		1,824	580	540
Sand and gravel—								
Sand and gravel for railway ballast..... tons	135,866	219,407	536,267	1,507,785	143,991	327,438	228,929	124,035
\$	21,600	33,278	94,021	316,620	24,056	48,615	42,198	22,900
Sand and gravel for concrete, roads, etc..... tons	2,002,724	3,012,812	6,714,880	6,113,352	1,171,351	1,545,130	574,739	1,764,763
\$	1,202,170	1,256,050	1,591,417	2,757,967	471,958	350,769	568,541	789,242
Mine filling..... tons				1,156,445		10,299		286,249
\$				170,328		2,800		21,204
Crushed gravel..... tons		129,609	1,994,942	275,605	33,566	2,700		38,921
\$		72,023	773,645	180,391	12,425	1,500		16,356
Total..... tons	2,139,427	33,373,303	10,050,985	9,350,875	1,363,593	1,913,995	817,168	2,284,995
Gross value..... \$	1,225,827	1,363,051	2,703,632	3,537,216	514,404	408,199	619,105	870,268

Table 394.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1939

	Capital employed as represented by:					Total
	Present cash value of the land*	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	
	\$	\$	\$	\$	\$	\$
Nova Scotia.....	(a)	(a)	(a)	(a)	(a)	(a)
New Brunswick.....	5,000	60,000	1,000		9,000	75,000
Quebec.....	40,165	197,890	6,280	200	45,636	290,171
Ontario.....	244,967	431,013	26,283	58,678	251,577	1,012,518
Manitoba.....	333,805	138,778	24,395	12,365	137,799	647,172
Saskatchewan.....	29,290	57,498	400	5,100	26,715	119,003
Alberta.....	1,000	14,679	(a)	2,000	18,113	35,792
British Columbia.....	139,120	345,629	2,786	9,484	59,045	556,064
Canada.....	793,347	1,245,487	61,144	87,827	547,885	2,735,690

* Excluding unmined materials.

(a) Not available.

† Includes value of dredges.

Table 395.—Employees, Salaries and Wages in the Sand and Gravel Industry, by Provinces, 1939

Province	Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....		246	246		229,616	229,616
New Brunswick.....	1	1,525	1,526	3,000	825,741	828,741
Quebec.....	30	2,851	2,881	23,660	1,733,396	1,757,056
Ontario.....	28	375	403	52,728	360,127	412,855
Manitoba.....	17	344	361	38,329	164,862	203,191
Saskatchewan.....	3	318	321	4,200	177,488	181,688
Alberta.....	4	249	253	15,500	234,725	250,225
British Columbia.....	18	111	129	31,977	86,564	118,541
Canada.....	101	6,019	6,120	169,394	3,812,519	3,981,913

Table 396.—Average Number of Wage-earners, by Months, 1938-1939

Month	1938	1939
January.....	458	203
February.....	476	245
March.....	466	340
April.....	935	821
May.....	12,762	11,054
June.....	14,195	13,444
July.....	13,889	13,591
August.....	13,872	12,451
September.....	12,905	10,253
October.....	9,559	5,199
November.....	1,259	1,032
December.....	574	382

THE STONE INDUSTRY IN CANADA

The Stone Industry in Canada comprises two main divisions:—1. **The Stone Quarrying Industry**, including quarries and dressing works operated in conjunction with quarries, and 2. **The Monumental and Ornamental Stone Industry**, comprising the operations of firms having no quarries but who operate dressing works where stone for building and monumental purposes is cut, polished or otherwise finished. In the Census of Industry, statistics on the stone quarrying industry are included under mining, while statistics of the monumental and ornamental stone industry are included under manufactures. For convenience this report carries data for both of these industries.

These two major divisions, constituting the Canadian stone industry, represented a capital investment of \$17,204,666 in 1939. Production during the year totalled \$9,022,138 which figure includes the value of the quarry output and the value added by manufacturing in the secondary stone industry. Salaried employees and wage-earners in 1939 numbered 4,333 and their combined earnings amounted to \$4,275,358.

The two industries are treated separately in the following review.

1. PRIMARY PRODUCTION—THE STONE QUARRYING INDUSTRY

The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks, including limestones, sandstones and marbles are quarried at various points in Canada. The products from quarries operating in these different formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their increasing requirements.

The gross value of all varieties of stone produced in Canada during 1939 totalled \$6,475,696 compared with \$5,556,026 in 1938. Comprising the tonnage shipped in 1939 were 1,102,395 tons of granite valued at \$2,119,501; 4,149,589 tons of limestone at \$3,817,551; 14,124 tons of marble at \$200,054; 176,265 tons of sandstone at \$331,830 and 1,149 tons of slate worth \$6,760. Of the total value of stone sold in 1939, the value of Quebec shipments amounted to 51 per cent, Ontario 35 per cent and British Columbia 6 per cent.

Imports of stone and various stone products during 1939 were appraised at \$963,560 compared with \$768,412 in 1938. Exports of stone from Canada in 1939 were valued at \$215,860 as against \$225,586 in the preceding year.

The number of firms in the stone quarrying industry reported as active in 1939 totalled 452; capital employed amounted to \$12,213,030; employees numbered 3,076; salaries and wages paid aggregated \$2,816,578 and the cost of fuel, electricity and process supplies used was reported at \$1,081,884.

Table 397.—Production (Sales) of Stone from Canadian Quarries, by Kinds and by Provinces, 1938 and 1939

Province	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
1938						
Nova Scotia.....tons	5,765	20,957		36,940		63,662
\$	31,768	34,696		80,480		146,944
New Brunswick.....tons	954	7,985		4,340		13,279
\$	71,600	19,855		28,870		120,325
Quebec.....tons	294,446	1,850,019	8,838	42,587	494	2,196,384
\$	757,531	1,672,260	46,580	51,010	547	2,527,928
Ontario.....tons	254,917	2,242,964	10,537	4,662	211	2,513,291
\$	351,941	1,911,841	40,694	16,220	2,469	2,323,165
Manitoba.....tons	329	39,049				39,378
\$	6,120	95,497				101,617
Alberta.....tons		1,691				1,691
\$		6,148				6,148
British Columbia.....tons	148,896	125,842		13,325	274	288,337
\$	160,457	124,322		41,825	3,295	329,899
Canada.....tons	705,307	4,288,507	19,375	101,854	979	5,116,022
\$	1,379,417	3,864,619	87,274	218,405	6,311	5,556,026
1939						
Nova Scotia.....tons	885	17,239		31,711		49,835
\$	20,809	33,941		79,167		133,917
New Brunswick.....tons	1,492	52,505		21,412		75,409
\$	72,005	142,927		51,175		266,107
Quebec.....tons	503,011	1,904,658	7,600	112,403	683	2,528,355
\$	1,276,859	1,726,653	168,612	150,792	683	3,323,599
Ontario.....tons	495,619	1,931,285	6,519	4,124	47	2,437,594
\$	625,880	1,624,618	30,642	16,322	649	2,298,111
Manitoba.....tons	174	35,969				36,143
\$	3,544	80,404				83,948
Alberta.....tons		2,888	5	155		3,048
\$		8,166	800	5,314		14,280
British Columbia.....tons	101,214	205,045		6,460	419	313,138
\$	120,404	200,842		29,060	5,428	355,734
Canada.....tons	1,102,395	4,149,589	14,124	176,265	1,149	5,443,522
\$	2,119,501	3,817,551	200,054	331,830	6,760	6,475,696

NOTE.—Not included in the above limestone statistics are 1,344,868 tons of limestone consumed in the cement industry in 1938 and 1,379,858 tons in 1939. Limestone used in the Canadian lime industry is also not included; it is estimated that approximately 900,000 tons of limestone were burned in the manufacture of lime in 1938 and more than 900,000 tons in 1939.

(a) All igneous rocks included.

(b) Includes dolomite, also marl for agricultural purposes.

Table 398.—Production* of Stone in Canada, by Provinces, Showing Purposes for which Used, 1939 (a)

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough..... tons	50	718	13,532	11,327	1,681		3,810	31,118
..... \$	300	3,035	70,741	71,132	19,026		12,240	176,474
Dressed..... tons	950	2,400	31,883	3,919	510	108	400	40,170
..... \$	28,000	44,000	998,242	37,809	21,595	5,220	23,000	1,157,866
Monumental and ornamental—								
Rough..... tons	126	305	4,026	338	62			4,857
..... \$	1,900	1,325	36,222	6,445	2,306			48,198
Dressed..... tons	347	476	2,271	10	26	5	304	3,439
..... \$	18,600	67,970	137,962	325	790	800	38,374	264,821
Flagstone..... tons		5	206	1,002	390			1,603
..... \$		50	419	3,856	1,755			6,050
Curbstone..... tons			1,440				6	1,446
..... \$			7,343				205	7,548
Paving blocks..... tons			774				1	775
..... \$			6,213				20	6,233
Lining open-hearth furnaces..... tons				24,331				24,331
..... \$				17,038				17,038
Chemical—								
Flux in iron and steel furnaces..... tons			4,230	127,874	3,479			135,583
..... \$			8,632	92,769	6,347			107,748
Flux in smelters..... tons				103,243			35,144	138,387
..... \$				72,834			23,090	95,924
Glass factories..... tons			173			890		1,063
..... \$			848			1,112		1,960
Pulp and paper mills..... tons	4,693	2,265	73,618	32,542	1,364		60,672	175,154
..... \$	9,403	3,850	82,811	29,616	1,533		78,913	206,126
Sugar refineries..... tons		75			5,066			5,141
..... \$		300			5,464			5,764
Other chemical uses..... tons				121,950				121,950
..... \$				106,057				106,057
Pulverized stone—								
Whiting (substitute)..... tons				100				100
..... \$				1,250				1,250
Asphalt filler..... tons	300		4,674	14,752				19,726
..... \$	1,150		14,759	29,949				45,858
Dusting coal mines..... tons						585		585
..... \$						2,340		2,340
Agricultural purposes..... tons	12,246	48,453	114,510	16,390	24	701	181	192,505
..... \$	23,388	136,715	84,067	23,565	31	2,804	724	271,294
Other uses..... tons			377	13,670	563	41	119	14,770
..... \$			1,237	51,733	692	164	1,215	55,041
Crushed stone for artificial stone..... tons			504	809			3	1,316
..... \$			2,660	1,474			30	4,164
Roofing granules..... tons			340	11,042			419	11,801
..... \$			570	93,708			5,428	99,706
Poultry grit..... tons		31	306	1,394	655	296	401	3,083
..... \$		310	1,755	6,755	1,861	1,184	584	12,449
Stucco dash..... tons			950	350	74		121	1,495
..... \$			5,988	2,100	301		1,009	9,398
Terrazzo chips..... tons			847	2,199				3,046
..... \$			4,982	10,223				15,205
Rock wool..... tons				4,665				4,665
..... \$				4,905				4,905
Rubble and riprap..... tons	3,380	20,581	286,625	55,355	365	47	62,852	429,205
..... \$	2,800	8,352	250,214	34,186	415	94	44,941	341,002
Crushed stone—								
Concrete aggregate..... tons	9,000		999,045	336,591				1,344,636
..... \$	14,000		819,563	275,465				1,109,028
Road metal..... tons	18,743	100	906,569	1,042,632	20,242	375	142,645	2,131,306
..... \$	34,376	200	741,301	857,317	19,680	562	119,901	1,773,337
Railroad ballast..... tons			81,455	511,109	1,642		6,060	600,266
..... \$			47,070	467,600	2,152		6,060	522,882
Total..... tons	49,835	75,409	2,528,355	2,437,594	36,143	3,048	313,138	5,443,522
..... \$	133,917	266,107	3,323,599	2,298,111	83,948	14,280	355,734	6,475,696
Per cent of total..... Quantity	0.92	1.38	46.45	44.78	0.66	0.06	5.75	100.00
..... Value	2.07	4.11	51.32	35.49	1.30	0.22	5.49	100.00

Note.—See footnote to table 397.

* Sales or shipments from quarries.

(a) Includes the production of slate.

Table 399.—Production (Sales) of Stone from Canadian Quarries by Kinds Showing Purposes for which Used, 1939

For use as follows—	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
Building stone—Rough..... tons	12,098	14,821	88	4,111		31,118
..... \$	64,752	89,191	4,744	17,787		176,474
Dressed..... tons	17,460	17,296	955	4,459		40,170
..... \$	561,253	349,547	145,618	101,448		1,157,866
Monumental and ornamental stone—						
Rough..... tons	4,613	33	211			4,857
..... \$	42,678	12	5,508			48,198
Dressed..... tons	3,262	165	5	7		3,439
..... \$	260,375	3,321	800	325		264,821
Flagstone..... tons	99	684		820		1,603
..... \$	225	2,297		3,558		6,080
Curbstone..... tons	1,446					1,446
..... \$	7,548					7,548
Paving blocks..... tons	775					775
..... \$	6,233					6,233
Lining open-hearth furnaces..... tons		24,331				24,331
..... \$		17,038				17,038
Chemical—						
Flux in iron and steel plants..... tons		135,583				135,583
..... \$		107,748				107,748
Flux in smelters..... tons		138,387				138,387
..... \$		95,924				95,924
Glass factories..... tons		890	173			1,063
..... \$		1,112	848			1,960
Pulp and paper mills..... tons		175,154				175,154
..... \$		206,126				206,126
Sugar refineries..... tons		5,141				5,141
..... \$		5,764				5,764
Other chemical uses..... tons		121,950				121,950
..... \$		106,057				106,057
Pulverized stone—						
Whiting (substitute)..... tons		100				100
..... \$		1,250				1,250
Asphalt filler..... tons		19,726				19,726
..... \$		45,858				45,858
Dusting coal mines..... tons		585				585
..... \$		2,340				2,340
Agricultural purposes..... tons		191,833	672			192,505
..... \$		269,353	1,941			271,294
Other uses..... tons		13,357	1,403		10	14,770
..... \$		50,172	4,766		103	55,041
Crushed stone for manufacture of artificial						
stone..... tons	173		1,143			1,316
..... \$	115		4,049			4,164
Roofing granules..... tons	10,865	462	80		456	11,801
..... \$	92,782	630	320		5,974	99,706
Poultry grit..... tons	6	1,645	1,432			3,083
..... \$	90	5,344	7,015			12,449
Stucco dash..... tons	20	175	1,300			1,495
..... \$	200	1,110	8,088			9,398
Terrazzo chips..... tons			3,046			3,046
..... \$			15,205			15,205
Rock wool..... tons		4,665				4,665
..... \$		4,905				4,905
Rubble and riprap..... tons	174,437	218,000	3,326	32,759	683	429,205
..... \$	169,360	152,581	832	17,546	683	341,002
Crushed stone—						
Concrete aggregate..... tons	270,224	1,039,666	38	34,708		1,344,636
..... \$	255,322	811,586	152	41,968		1,109,028
Road metal..... tons	201,645	1,836,068	252	93,341		2,131,306
..... \$	262,303	1,367,728	168	143,138		1,773,337
Railroad ballast..... tons	405,272	188,934		6,060		600,266
..... \$	396,265	120,557		6,060		522,882
Total Canada (b)..... tons	1,102,395	4,149,589	14,124	176,265	1,149	5,443,522
..... \$	2,119,501	3,817,551	200,054	331,830	6,760	6,475,696

(a) Includes all igneous rock.

(b) Does not include limestone used in Canadian lime and cement industries, but includes marl used for agricultural purposes.

GRANITE

Large areas in Canada are underlain by granite, much of which is suitable for all the purposes for which the stone is used. The stone quarried consists of granite and related crystalline igneous rocks which are used for building, decorative, ornamental, or construction purposes, and is obtained from properties in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba and British Columbia. Granite is employed for building purposes mainly in the larger buildings such as public and semi-public structures and institutions. In the building trade, coloured granites are being used to an increasing extent in the form of thin polished slabs for trim for buildings where contrast is called for in the main colour scheme. At present, the so-called "black granite" and the "grey" seem to be in most demand for monuments. Stone used in the National Memorial at Ottawa was quarried during 1938 from Rivière-a-Pierre district northeast of Three Rivers, Quebec; more than 800 tons of dressed granite were used in the erection of the memorial. The largest block used weighed over 40 tons dressed.

Table 401.—Production of Granite* in Canada, for Years Specified

Year	Short tons	\$	Year	Short tons	\$
1932.....	490,822	1,110,582	1936.....	941,743	1,319,313
1933.....	256,723	679,585	1937.....	1,135,099	1,827,433
1934.....	200,285	781,739	1938.....	705,307	1,379,417
1935.....	326,354	1,126,287	1939.....	1,102,395	2,119,501

* Includes all igneous rock.

LIMESTONE

Limestone, on account of the great variety and importance of its industrial uses, is the most useful of all rocks. It is quarried in all provinces of Canada except Prince Edward Island and Saskatchewan. New uses are continually being developed, especially for ground and pulverized limestone in chemical processes.

Rock-wool plants in Canada were active during the year and it is of interest to note that Canadian rock-wool, made from argillaceous dolomite, was exported to England, Switzerland, Finland, Holland, South Africa, British West Indies, and the Argentine.

Dolomite is acquiring importance in Europe as a raw material for making metallic magnesium. Canada possesses ample deposits of high-grade dolomite and developments are being watched with interest in this country.

The application of the use of limestone in agriculture in Canada is capable of enormous development and is worthy of serious attention on the part of the producers.

Although limestone is widely distributed throughout Canada and is quarried on a large scale from numerous quarries, it is one of the low-priced industrial minerals and, in consequence, it has been found more advantageous to employ foreign material at certain consuming centres in Canada, where it can be delivered more cheaply than from a domestic source. Such material is imported in considerable quantities from the United States and Newfoundland for use as blast furnace flux, and from the United States alone for road metal, and for some pulp mills in Ontario near the International boundary.

An appreciable increase has occurred in the production of limestone for structural use in Canada during the past year, particularly from Ontario and Quebec. The limestone deposits now being worked for building stone are favourably situated with respect to centres of population and the supply of stone is adequate for present and future demands.

Variety in the resources of limestone is an important factor insofar as utilization is concerned. Hard, tough, siliceous limestone is preferred for making of road metal and railway ballast. Argillaceous limestone, having a low content of magnesium carbonate, is utilized in the Portland cement industry. Argillaceous, magnesian limestone is desired for making rock-wool. The glass industry can use siliceous limestone provided the iron content is low. For most chemical and metallurgical uses, however, pure limestone, generally of the high-calcium variety, is preferred.

Furthermore, where the limestone is to be used in its calcined state, it should be free from such impurities as would make the lime dark in colour. The great proportion of limestone products ranging from flux stone of various sizes down to granules for poultry grit and roofing granules, require careful crushing and screening. The pulverized products must also be very carefully prepared to conform to stringent specifications regarding fineness. Recent years have witnessed an increasing demand for washed stone. (Bureau of Mines, Ottawa).

Table 402.—Production of Limestone in Canada, for Years Specified

Year	Short tons	\$	Year	Short tons	\$
1932.....	3,687,241	3,227,715	1936.....	3,731,548	3,143,872
1933.....	2,572,911	2,142,516	1937.....	5,542,806	4,673,942
1934.....	3,747,779	3,157,832	1938.....	4,288,507	3,864,619
1935.....	3,631,665	3,253,573	1939.....	4,149,589	3,817,551

SANDSTONE

Canadian sandstone has been utilized extensively in the construction of many important public buildings in Canada and is finding increasing favour as a material in the construction of the better type home. The rock occurs in Canada in a variety of colours, including white, reddish brown, purple (bands), yellow and grey. Shipments of sandstone were made in 1939 from quarries located in all of the provinces with the exception of Prince Edward Island, Manitoba and Saskatchewan.

Table 403.—Production of Sandstone in Canada, for Years Specified

Year	Short tons	\$	Year	Short tons	\$
1932.....	500,480	349,458	1936.....	285,508	495,856
1933.....	99,043	108,562	1937.....	235,165	343,871
1934.....	115,169	143,283	1938.....	101,854	213,405
1935.....	342,824	838,005	1939.....	176,265	331,830

MARBLE

The production of marble depends largely on the status of the building industry in Canada for the market for Canadian marbles is mainly domestic.

The Canadian market calls for interior decorative marble almost entirely, and very little is used for the exteriors of buildings. A considerable amount is, however, used for tombstones. In recent years there has been an increasing demand for marble in the form of terrazzo for flooring, replacing slabs or tiles.

Marble quarries are operated in the provinces of Quebec, Ontario, Manitoba, and British Columbia and furnish many colour varieties.

Several developments of interest occurred during the year. A newly incorporated company—MAB, Limited, with head office at Quebec—was formed to engage in the quarrying of red marble and slate near St. Joseph de Beauce, Beauce county, Quebec.

In Ontario, in the quarry of the Silvertone Black Marble Quarries, Limited, at St. Albert, a 40-inch bed of marble was uncovered that, by virtue of its uniform quality and freedom from flaws, is a potential source of material for the turning of monolithic pillars.

In Alberta, a number of blocks of travertine were quarried from a deposit on the north bank of the Bow river, near Radnor, 35 miles west of Calgary.

Many deposits of beautifully coloured marbles, particularly in Ontario, Quebec, and British Columbia, have never been fully investigated, chiefly because the present demand in Canada for marble of any one colour other than for a staple variety, such as, white, is comparatively small. The demand for marble of a certain colour also changes from time to time; at present, there is little call for red and blue, but buff and black marbles are in vogue. (Bureau of Mines, Ottawa).

Table 404.—Production of Marble in Canada, for Years Specified

Year	Short tons	\$	Year	Short tons	\$
1932.....	12,379	250,706	1936.....	22,866	169,698
1933.....	10,897	65,913	1937.....	21,642	88,595
1934.....	13,783	69,475	1938.....	19,375	87,274
1935.....	15,975	85,369	1939.....	14,124	200,054

SLATE

In 1939 slate was shipped from quarries located in Quebec, Ontario and British Columbia and was sold in the form of roofing slates, granules, flour and rubble and rirap.

Table 405.—Production of Slate in Canada, for Years Specified

Year	Short tons	\$	Year	Short tons	\$
1932.....	250	3,750	1936.....	1,247	5,414
1933.....	250	3,750	1937.....	900	5,519
1934.....	738	4,802	1938.....	979	6,311
1935.....	1,129	4,329	1939.....	1,149	6,760

Table 406.—Production of Stone for Building Purposes, Chemical Use, Cement Manufacture, Concrete Aggregate, Road Metal and Railroad Ballast, 1934-1939

—	Building stone (a)	For chemical purposes (b)	For concrete aggregate	For road metal	For railroad ballast	For cement manufacture
1934.....tons	52,665	489,580	821,099	2,062,487	345,802	806,546
\$	490,095	447,429	608,240	1,668,927	209,296	.....
1935.....tons	200,899	537,799	804,719	1,976,363	351,302	818,443
\$	1,258,741	483,709	523,847	1,987,351	211,993	.....
1936.....tons	42,335	615,207	1,014,145	1,903,927	784,081	1,180,358
\$	714,616	553,597	730,617	1,653,134	659,656	.....
1937.....tons	49,098	693,947	1,497,655	3,169,136	642,248 (c)	1,465,168
\$	746,370	626,297	1,214,181	2,522,080	570,606	.....
1938.....tons	49,666	551,737	981,739	2,721,922	86,019 (d)	1,358,689
\$	725,402	468,000	791,971	2,347,010	58,816	.....
1939.....tons	71,288	577,278	1,344,636	2,131,306	600,266 (d)	1,407,099
\$	1,334,340	523,579	1,109,028	1,773,337	522,882	.....

(a) Does not include monumental or ornamental stone.

(b) Does not include limestone used in Canadian lime industry.

(c) Includes shale.

(d) Includes 13,821 tons shale in 1938 and 27,241 tons in 1939.

WHITING SUBSTITUTE

(Bureau of Mines, Ottawa)

Whiting substitute, as the name implies, is chiefly used as a substitute for whiting made from chalk, from which it differs in certain of its characteristics and because of this it also has a field of usefulness of its own. It finds its principal use in the manufacture of oilcloth, linoleum, certain kinds of rubber products, putty and explosives. In lesser quantities it is used in the manufacture of moulded articles, cleaning compounds and polishes, as a ceramic glaze and for a number of other purposes. At present all whiting substitute produced in Canada is made from white marble or white limestone containing only a small percentage of magnesium carbonate, though in the past a whiting substitute made from white dolomite was produced in Eastern Canada for making putty. The marble and limestone are pulverized to such fineness that practically all of the product will pass a 326-mesh screen, though for certain uses 200-mesh material is suitable.

The principal differences between whiting substitute and chalk whiting are that the former is generally much whiter, has a lower capacity for absorbing oil, and the individual particles are sub-angular rather than rounded.

Whiting substitute is manufactured by Pulverized Products, Limited, Montreal; by Claxton Manufacturing Company, Toronto; by White Valley Chemicals, Limited, Toronto; by Gypsum Lime and Alabastine, Canada, Limited, Winnipeg; and by F. J. Beale, Limited, Van Anda, Texada Island, British Columbia.

During 1939, White Valley Chemicals, Limited, built a plant at Bobcaygeon, Ontario, to produce whiting substitute from marl.

Carbonate filler, a product closely akin to whiting substitute and made by introducing carbon dioxide gas into milk-of-lime made from high-calcium quicklime, has been produced in Canada for the past three years. Its use up to the present has been as a filler in newsprint and book paper, and its manufacture has been undertaken by the paper companies using it.

By-product precipitated chalk, made from waste sludge resulting from the manufacture of caustic soda from soda ash and lime, is classed as a whiting substitute, but its usefulness is restricted by the fact that it almost invariably contains a small amount of free alkali. The raw materials for the manufacture of by-product precipitated chalk are available but it is not yet being made in Canada.

Table 407.—Consumption of Whiting, (and Chalk), by Uses, as Reported to the Annual Census of Industry, 1938 and 1939

Industry	1938		1939	
	Tons	Cost at works	Tons	Cost at works
		\$		\$
Paints and pigments.....	6,304	113,206	6,733	126,042
Rubber.....	6,177	88,683	7,856	120,100
Miscellaneous textiles*.....	1,054	16,482	1,033	14,885
Explosives (a).....	243	1,671	264	1,824
Toilet preparations (†).....	61	5,812	112	8,350

* Includes oilcloth and linoleum.

(a) Chalk.

† Ground and precipitated.

Table 408.—Employees, Salaries and Wages, Specified Costs and Net Values, in the Stone Industry in Canada, by Provinces, 1939

Province	Firms	Average number of employees			Salaries and wages		Cost of fuel, electricity and process supplies used	Net value of production
		Salaried employees	Wage-earners		Salaries	Wages		
	No.	Male	Female		\$	\$	\$	\$
Nova Scotia.....	18	8	.....	72	17,500	49,595	18,143	115,774
New Brunswick.....	8	10	1	125	19,810	99,080	16,660	249,447
Quebec.....	218	152	6	1,745	202,122	1,375,143	531,029	2,792,570
Ontario.....	175	87	15	652	182,434	644,515	476,867	1,821,244
Manitoba.....	5	9	1	38	24,399	31,159	8,454	75,494
Alberta.....	3	.....	.....	5	.....	3,552	248	14,032
British Columbia.....	25	13	1	136	26,148	141,121	30,483	325,251
Canada.....	452	279	24	2,773	472,413	2,344,165	1,081,884	5,393,812

Table 409.—Capital Employed in the Stone Quarrying Industry of Canada, by Provinces, 1939

	Plants	Capital employed as represented by:					
		Present cash value of the land*	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	No.	\$	\$	\$	\$	\$	\$
Nova Scotia.....	27	24,491	111,800	4,825	8,020	17,150	166,286
New Brunswick....	8	52,700	72,229	9,994	5,520	102,915	243,358
Quebec.....	234	1,104,109	2,926,763	247,718	336,067	724,718	5,339,375
Ontario.....	183	709,544	4,017,477	131,192	196,245	555,066	5,609,524
Manitoba.....	6	70,090	89,169	3,009	.....	63,091	225,359
Alberta.....	3	200	2,500	200	.....	3,500	6,400
British Columbia..	112	42,799	475,353	28,411	19,618	56,547	622,728
Canada.....	573	2,003,933	7,695,291	425,349	563,470	1,522,987	12,213,030

* Excluding unmined materials. (a) Not available.

Table 410.—Average Number of Wage-earners, by Months, 1938 and 1939

Month	1938	1939		Month	1938	1939	
		Quarry	Dressing works			Quarry	Dressing works
January.....	1,215	1,166	366	July.....	3,690	3,251	663
February.....	1,223	1,181	432	August.....	3,399	3,166	638
March.....	1,290	1,344	441	September.....	3,346	2,926	676
April.....	1,992	1,612	533	October.....	3,315	2,605	616
May.....	2,866	2,357	664	November.....	2,901	2,146	599
June.....	3,146	3,067	696	December.....	2,050	1,390	498

Table 411.—Imports into Canada and Exports of Stone, by Kinds, 1938 and 1939

	1938		1939	
	Tons	Value \$	Tons	Value \$
IMPORTS—				
Curling stones and handles.....pair	746	16,385	586	13,017
Building stone, other than marble or granite, planed, turned, cut or further manufactured than sawn on four sides.....	0.1	10	0.2	11
Flagstone, sandstone, and all building stone, not hammered, sawn or chiselled.....	3,604	20,757	4,586	27,801
Flagstone and building stone, other than marble or granite, sawn on not more than two sides.....	1,849	13,997	1,169	9,644
Granite, rough, not hammered or chiselled.....		62,735		67,273
Granite, sawn only.....		10,429		10,156
Granite, monuments.....		16,949		10,941
Granite, manufactures of, n.o.p.....		8,990		6,368
Marble, rough, not hammered or chiselled.....		23,102		20,436
Marble, sawn or sand rubbed, not polished.....		28,051		32,716
Marble, not further manufactured than sawn for tombstones.....		11,886		11,088
Marble, manufactures of, n.o.p.....		8,634		11,184
Ornamental or decorative marble (not chips), unicolour or variegated, of colours or texture not produced in Canada; rough or dressed, etc., for church interiors.....		9,743		22,373
Paving blocks of stone.....				
Refuse stone, not sawn, hammered or chiselled.....	303,103	160,618	504,592	287,577
Slate roofing.....square	1,174	10,651	953	7,856
Slate pencils and school writing slates.....		5,244		4,618
Slate mantels and manufactures of slate, n.o.p.....		19,935		17,785
Chalk, china, Cornwall or cliff stone and mica schist.....		22,572		22,831
Mineral wool.....	669	45,109	911	44,860
Whiting, gilders' whiting and Paris white.....	10,701	116,923	13,195	152,397
Manufactures of stone, n.o.p.....		30,518		16,531
Lithographic stones not engraved.....		449		
Chalk, prepared.....		5,731		8,295
Pumice and pumice stone, lava and calcareous tufa, not further manufactured than ground.....		24,688		29,314
Grindstones, not mounted, and not less than 36 inches in diameter.....no.	840	91,205	849	126,260
Burrstones, rough in blocks.....no.	22	213	15	210
Ganister.....	360	2,888	255	2,018
Total.....		768,412		963,560
EXPORTS—				
Crushed stone†.....	112,537	198,720	32	32
Granite and marble, unwrought.....	657	5,042	925	10,235
Freestone, limestone, and other building stone, unwrought.....	42	227	94	828
Dressed stone of all kinds.....		16,156		2,035
Grindstones, manufactured.....		5,441		6,312
Quartzite.....			108,397	196,418
Total.....		225,586		215,860

† Included quartzite (silica) prior to January 1, 1939.

2. Secondary Production—The Monumental and Ornamental Stone Industry

In 1939 there were 190 stone dressing works whose operations were reported separately from the quarries. These plants were engaged chiefly in cutting or polishing Canadian or imported stone to produce finished monuments or cut and dressed stone for construction purposes. Retail establishments engaged only in selling and lettering monuments have not been included.

Output from this industry was valued at \$3,805,989 in 1939, a decline of 2.5 per cent from the total of \$3,902,774 reported for the previous year. The 87 works in Ontario accounted for 54 per cent of the total output and the 44 plants in Quebec for 27 per cent. The average number of employees was 1,257 and \$1,458,780 were paid in salaries and wages. Materials used in the cutting and dressing processes, including stone, cost \$1,259,547 and expenditures for fuel and electricity amounted to \$139,438.

Table 412.—Cost of Stone Used in the Monumental and Ornamental Stone Industry, 1938 and 1939

	Cost at works	
	1938	1939
Granite and marble from Canadian quarries.....	\$ 647,007	\$ 521,918
Granite and marble (imported).....	260,572	307,984
Monuments, cut and polished, for lettering only.....	189,357	106,275
All other materials.....	174,714	323,370
Total.....	1,271,650	1,259,547

Table 413.—Production from the Monumental and Ornamental Stone Industry, by Provinces, 1938 and 1939

	Granite		Marble		Marble chips and dust	Limestone		Finished monuments, lettered only	Other products	Total
	Monuments	For building purposes	Monuments	For building purposes		Monuments and bases	For building purposes			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Prince Edward Island and New Brunswick—										
1938.....	65,399	1,398	700	14,770	.....	.....	.....	7,275	300	89,842
1939.....	63,283	87	13,780	.....	.....	1,610	.....	8,595	280	87,635
Nova Scotia—										
1938.....	71,476	100	11,179	.....	.....	2,591	.....	24,650	3,762	113,758
1939.....	73,863	2,900	8,856	4,816	.....	.....	.....	25,875	1,709	118,019
Quebec—										
1938.....	323,656	40,004	28,068	203,539	67,923	13,993	140,783	22,822	17,026	857,814
1939.....	323,922	281,547	15,298	76,494	37,076	4,795	119,050	34,516	138,921	1,031,619
Ontario—										
1938.....	819,917	15,123	40,121	142,964	75	63,431	669,865	264,559	231,959	2,248,014
1939.....	799,165	436	57,932	72,881	518	37,914	539,317	89,320	446,899	2,044,382
Manitoba—										
1938.....	69,190	670	7,457	8,250	325	11,785	.....	34,990	4,659	137,326
1939.....	71,968	1,911	11,033	5,837	255	6,690	3,591	534	819	102,638
Saskatchewan—										
1938.....	31,266	670	21,718	175	2,980	4,918	3,475	13,933	4,710	83,845
1939.....	45,321	24,777	235	4,697	.....	.....	357	12,589	7,099	95,075
Alberta—										
1938.....	61,131	8,000	16,316	.....	10,009	3,628	18,000	13,480	1,202	131,766
1939.....	63,924	36,660	20,154	9,250	10,031	2,100	.....	9,719	2,964	154,802
British Columbia—										
1938.....	72,965	150,520	2,244	.....	.....	8,690	.....	3,960	2,030	240,409
1939.....	72,512	90,301	2,335	300	40	200	1,955	1,680	2,496	171,819
Canada—										
1938.....	1,515,000	216,485	127,803	369,698	81,312	109,036	832,123	385,669	265,648	3,902,774
1939.....	1,513,958	438,619	129,623	174,275	47,920	53,309	664,270	182,828	601,187	3,805,989

DIAMOND DRILLING INDUSTRY, 1940

There were 32 firms engaged in contract diamond drilling of Canadian mineral deposits during 1940 compared with 35 in 1939. The income received by this industry from drilling operations conducted during the year under review totalled \$3,021,629 as against \$3,013,249 in the preceding year. The number of employees in 1940 was reported at 1,350, and the amount of salaries and wages distributed totalled \$1,575,786. The footage drilled during 1940 in the entire Dominion aggregated 2,422,948 feet, of which 54 per cent was completed in Ontario, 32 per cent in Quebec, and 11 per cent in British Columbia. Contract diamond drilling was also conducted in Nova Scotia, Manitoba, Saskatchewan and the Northwest Territories.

The industry as a whole purchased, in 1940, borts, ballas, carbons, ready-set bits, etc., amounting in value to \$881,085 compared with \$607,806 in 1939. Data relating to Canadian imports and exports of diamonds in 1940 are not available for publication.

Not included in this survey are data relating to the drilling of gas and oil wells and diamond drilling conducted by Canadian mining companies with their own personnel and equipment. Statistics relating to these latter operations are combined with those pertaining to the Canadian mining industry proper.

It is interesting to note that in 1940 skilled personnel from both the Canadian Diamond Drilling Industry and the Canadian Mining Industry participated in important engineering work conducted by the British army in Europe.

Table 414.—Contract Diamond Drilling Operations in Canada, 1940

Province	Footage drilled	Income from drilling	Number of employees	Total wages paid
		\$		\$
Nova Scotia	7,463	15,300	16	7,282
New Brunswick				
Quebec	772,493	1,035,885	400	428,761
Ontario	1,302,848	1,556,927	707	829,341
Manitoba	14,189	18,657	15	6,009
Saskatchewan	25,473	31,617	10	10,496
Alberta				
British Columbia	277,793	332,434	185	283,558
Yukon				
Northwest Territories	22,689	30,809	17	10,339
Canada	2,422,948	3,021,629	1,350	1,575,786

Value of stones and ready-set bits purchased, 1940..... \$881,085

Table 415.—Contract Diamond Drilling Operations in Canada, 1939

Province	Footage drilled	Income from drilling	Number of employees	Total salaries and wages paid
		\$		\$
Nova Scotia	9,298	18,441	20	12,914
New Brunswick	190	351	5	223
Quebec	599,121	900,559	793	423,538
Ontario	1,212,174	1,747,290	1,858	929,886
Manitoba	30,761	52,565	41	16,219
Saskatchewan	15,078	15,535	6	5,615
Alberta				
British Columbia	173,887	246,845	177	210,493
Yukon				
Northwest Territories	22,783	31,663	20	16,727
Canada	2,063,292	3,013,249	(a) 2,920	1,615,615

Value of stones and ready-set bits purchased, 1939..... \$607,806

(a) Includes part-time employees.

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1939.

Arsenic.—White arsenic (As_2O_3) shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average London price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by the Ontario smelter producing these products added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the net amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average London price for the year, in Canadian funds; (b) Copper in blister copper made at Manitoba, Ontario and Quebec smelters valued at the average London price for the year in Canadian funds; (c) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products is valued at the standard rate of \$20.671834 per fine ounce until the end of 1930. For succeeding years, unless otherwise specified, gold is valued at the average price on world markets transposed to Canadian funds.

Lead.—Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued in Canadian funds at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in Canadian funds in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

Platinum Group Metals.—Recoverable metals in smelter products and placer platinum at the average London price and transposed to Canadian funds.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price in Canadian funds for the refined metal.

Tellurium and Selenium.—Smelter production valued at the average London price for the year.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co., Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co., Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London, in Canadian funds.

Coal.—Output tonnage evaluated prorata according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements and quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country, the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression "ton" means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

Unless otherwise arranged, the data relating to the operations of less than three firms producing the same commodity or mineral are not published separately.

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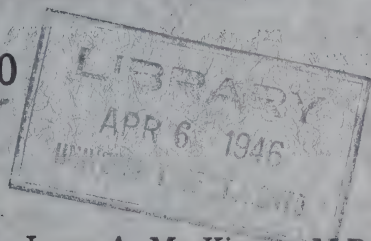
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DURING THE CALENDAR YEAR

1940



Published by Authority of the Hon. James A. MacKinnon, M.P.,
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PREFACE

Because of the importance of the Canadian mining industry in the economic life of the Nation, it has been the practice for the past number of years for the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics to issue three reports a year on mineral production. The first is a preliminary estimate which is published in mimeographed form on the first day of January following the year to which it refers. During the second week of March a preliminary report is printed containing more complete figures and greater detail. The results are printed in this report when all returns have been received and the final compilation is made.

Owing to wartime censorship, the preliminary bulletins for 1940 were issued in abbreviated mimeographed form, no figures of production by provinces, and no figures on the production of base metals and certain strategic non-metallic minerals were given out. The information, however, was compiled and made available for Governmental information.

In order to have continuity of the printed record, it was decided to print this report in abbreviated form, but the distribution was to be for official use only. A sufficient number have, therefore, been printed for distribution to reference libraries after the war.

It will be noted that no figures on imports and exports are included as has been the custom in former years. These figures will be made available by the External Trade Branch of the Bureau after hostilities cease and nothing is gained by including them in the present report.

Similarly with world tables, the latest available figures were included in the report for 1939. These world tables will be brought up to date when world censorship regulations are lifted.

As in previous years, the Bureau cooperated with the Mines Department of the provinces of Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and British Columbia, in the collection of these statistics. Forms are filled out in duplicate, thereby saving the operator extra work and resulting in uniform totals for the provincial and Dominion statistical bureaux.

The thanks of the Bureau are tendered to the mine and smelter operators for assistance given and information made available. Railway and other transportation companies as well as smelter operators outside of Canada have also furnished data, the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. W. H. Losee, B.Sc., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., and Mr. B. R. Hayden, of the Mineral Division staff.

S. A. CUDMORE,

Acting Dominion Statistician.

DOMINION BUREAU OF STATISTICS,
OTTAWA, May 3, 1942.

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DOMINION BUREAU OF STATISTICS

S. A. CUDMORE, M.A. (Oxon) F.S.S., F.R.S.C., Acting Dominion Statistician
W. H. LOSEE, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch

ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1940

CHAPTER ONE

The year 1940 witnessed Canada's entry into her second year as a participant in the greatest World War in history. This memorable year saw the battle of Britain and the heroic and successful defence of the British Isles. It saw the conquest of the greater part of Continental Europe by the invader. During this eventful year France, Holland, Belgium, Norway and much of Eastern Europe fell under the control of a war machine that was years in the making. Against these forces was mustered the potential strength of the entire Commonwealth of British nations. In Canada the tempo of a nation long at peace was intensified towards an all-out war effort. Production of war materials increased and the nation began to gear itself for a life and death struggle.

In this struggle was thrown with fervor the entire weight and effort of the powerful and far flung Canadian mining industry. Its efforts were reflected in the statistics of production as recorded for the year under review. The total value of Canadian mineral production in 1940 amounted to \$529,825,035, the greatest ever recorded for the Dominion. The output of metals alone amounted to \$382,503,012 of which gold contributed \$204,479,083 or 53 per cent. Of the major and vital war metals produced were 655,593,441 pounds of copper, 245,557,871 pounds of nickel, 424,028,862 pounds of zinc and 471,850,256 pounds of lead. From recently developed deposits in British Columbia came a record output of 153,830 pounds of mercury. In Ontario, production of iron ore was increased at the New Helen mine, and a concentrated effort in the old Cobalt camp resulted in the largest recovery of cobalt since 1936. Tungsten showed a slight increase and plans were studied for the commercial production of metallic magnesium from Canadian ores.

Consistent with the expanding manufacture of war supplies was a distinct increase over 1939 of \$8,166,546 in the total value of all natural fuels produced. Coal output alone totalled 17,566,884 tons while crude petroleum from Canadian wells increased to 8,606,022 barrels as compared with 7,826,301 barrels in the preceding year.

Of the other non-metal products, the most pronounced increase was realized in the output of clay products, cement, stone and the various structural materials. This resulted largely from the great expansion in the construction of air training camps and various other Canadian defense projects.

The trend in mining employment as a whole was upward in eight months of 1940, when employment was in rather greater volume than in 1939, the previous maximum for this record; the annual index was 168.4, compared with 163.8 in the preceding year.

In coal-mining, the index averaged 91.3, or slightly above the 1939 figure of 89.3. The labour force of the 105 co-operating operators included 25,064 workers in 1940, as against a mean of 24,384 employees in 103 mines in the preceding year.

Employment in the extraction of metallic ores generally was greater than in 1939, or any other year for which statistics are available; the annual index, at 350.9, was a few points above the average of 343.1 in the preceding twelve months. The index varied between 342.4 at January 1, and 354.9 at June 1. The staffs of the 210 reporting firms averaged 43,983 during the year under review, compared with 42,548 in 233 mines during 1939. War-time demands for both precious and base metals resulted in the maintenance of a high level of activity among producing mines; however, in a number of cases it was reported that prospecting and development operations were curtailed.

Non-metallic minerals, other than coal, afforded more employment in 1940 than in any earlier year since 1920. The index averaged 142.6 or 5.1 per cent above the 1939 figure of 135.7.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1940

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
METALLICS						
Antimony.....	lb.					
Arsenic (As ₂ O ₃).....	lb.			(*)	2,093,275	
	\$			(*)	62,798	
Bismuth.....	lb.				17,789	
	\$				24,620	
Cadmium.....	lb.					57,742
	\$					67,154
Chromite.....	ton			335		
	\$			5,780		
Cobalt.....	lb.				794,359	
	\$				1,235,220	
Copper.....	lb.			134,166,955	347,931,013	75,267,937
	\$			13,532,079	34,742,229	7,591,524
Gold.....	fine oz.	22,219		1,019,175	3,261,688	152,295
	\$	459,307		21,068,216	67,425,073	3,148,217
Estimated exchange equalization on gold produced....	\$	396,125		18,170,022	58,149,915	2,715,140
Iron ore.....	ton				414,603	
	\$				1,211,305	
Lead.....	lb.				345,455	
	\$				11,614	
Manganese ore.....	ton	152				
	\$	4,315				
Mercury.....	lb.					
	\$					
Molybdenite (concentrates).....	lb.			22,251		
	\$			10,280		
Nickel.....	lb.				245,557,871	
	\$				59,822,591	
Palladium, rhodium, iridium, etc.....	fine oz.				91,522	
	\$				3,520,746	
Platinum.....	fine oz.				108,464	
	\$				4,239,424	
Radium and uranium (products).....	\$					
Selenium.....	lb.			43,510	136,350	
	\$			83,104	260,429	
Silver.....	fine oz.	725		1,340,450	5,563,101	1,033,512
	\$	277		512,709	2,127,831	395,308
Tellurium.....	lb.				3,491	
	\$				5,607	
Titanium ore.....	ton			4,535		
	\$			24,510		
Tungsten concentrates.....	lb.	8,586			1,064	
	\$	5,226			690	
Zinc.....	lb.	4,755,502		27,696,721		35,103,373
	\$	162,210		944,735		1,197,376
Total Metallics.....	\$	1,027,460		54,351,435	232,840,092	15,114,719

(*) Arsenic was shipped from a gold mine for experimental purposes.

An average payroll of 9,571 persons was employed during 1940 by the 103 co-operating firms, while those reporting in the preceding year had a mean of 9,052. Quarries and other divisions coming under this heading recorded a rather better situation.

Efforts throughout the year by both the Federal and Provincial Departments of Mines to stimulate the production of essential war metals and minerals received the most complete co-operation of the mining industry. Mining of ore deposits, particularly the non-ferrous ores, was increased and the non-ferrous smelting and refining industry commenced a program of plant expansion.

The efficient development of Canadian ore deposits, together with the Dominion's great hydro-electric power resources, have equipped and established her as one of the truly great arsenals of Democracy. She will play a very great part in the achievement of final victory.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1940

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
METALLICS						
Antimony.....lb.			2,594,492			2,594,492
\$			396,468			396,468
Arsenic (As ₂ O ₃).....lbs.						2,093,275
\$						62,798
Bismuth.....lb.			40,740			58,529
\$			56,384			81,004
Cadmium.....lb.	71,594		778,791			908,127
\$	83,264		905,734			1,056,152
Chromite.....ton						335
\$						5,780
Cobalt.....lb.						794,359
\$						1,235,220
Copper.....lb.	20,484,954		77,742,582			655,593,441
\$	2,066,112		7,841,117			65,773,061
Gold.....fine oz.	102,925	215	617,011	55,159	80,458	5,311,145
\$	2,127,649	4,444	12,754,749	1,140,238	1,663,214	109,791,107
Estimated exchange equalization on gold produced.....\$	1,834,964	3,833	11,000,175	983,383	1,434,419	94,687,976
Iron ore.....ton						414,603
\$						1,211,395
Lead.....lb.			466,849,112		4,655,689	471,850,256
\$			15,695,467		156,524	15,863,605
Manganese ore.....ton						152
\$						4,315
Mercury.....lb.			153,830			153,830
\$			369,317			369,317
Molybdenite (concentrates).....lb.						22,251
\$						10,280
Nickel.....lb.						245,557,871
\$						59,822,591
Palladium, rhodium, iridium, etc...fine oz.						91,522
\$						3,520,746
Platinum.....fine oz.			24			108,488
\$			938			4,240,362
Radium and uranium (products).....\$				410,176		410,176
Selenium.....lb.						179,560
\$						343,533
Silver.....fine oz.	1,691,540	20	11,885,556	59,505	2,259,343	23,832,752
\$	646,997	8	4,546,106	22,760	864,176	9,116,172
Tellurium.....lb.						3,491
\$						5,607
Titanium ore.....\$						4,535
\$						24,510
Tungsten concentrates.....lb.			2,352			12,002
\$			1,387			7,203
Zinc.....lb.	44,452,595		312,020,671			424,028,862
\$	1,516,278		10,643,025			14,463,624
Total Metallics.....\$	8,275,264	8,285	64,210,867	2,556,557	4,118,333	382,503,012

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1940—Continued

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
NON-METALLICS						
FUELS						
Coal.....	ton	7,848,921	547,064			1,697
	\$	28,766,195	1,963,012			4,037
Natural gas.....	M cu. ft.		616,041		13,053,403	600
	\$		300,543		7,745,834	180
Peat.....	ton				30	
	\$				75	
Petroleum, crude.....	bbbl.		22,167		137,644	
	\$		31,220		397,078	
Total Fuels.....	\$	28,766,195	2,294,775		8,142,987	4,217
Other Non-Metallic and Industrial Minerals						
Asbestos.....	ton			346,805		
	\$			15,619,865		
Barytes.....	ton	25			305	
	\$	162			4,577	
Diatomite.....	ton	241				
	\$	7,736				
Feldspar.....	ton			8,548	12,907	
	\$			89,004	98,619	
Fluorspar.....	ton	17			4,437	
	\$	365			58,952	
Graphite.....	\$				94,038	
Grindstones (includes pulpstones, etc.).....	ton	53	255			
	\$	2,378	12,000			
Gypsum.....	ton	1,278,204	52,218		75,271	23,108
	\$	1,302,347	102,980		313,512	137,051
Iron oxides (ochre).....	ton			9,603		
	\$			107,926		
Magnesitic-dolomite.....	\$			897,016		
Magnesium sulphate.....	ton					
	\$					
Mica.....	lb.			873,802	916,417	
	\$			202,583	31,962	
Mineral waters.....	Imp. gal.			109,025	31,638	
	\$			18,466	2,426	
Nepheline-syenite.....	\$				117,849	
Phosphate.....	ton			358		
	\$			4,039		
Quartz.....	ton	8,755		109,090	1,581,367	
	\$	15,670		321,891	810,285	
Salt.....	ton	42,495			(a) 412,401	3,076
	\$	220,328			2,371,780	45,731
Silica brick.....	M	2,809			62,661	
	\$	120,125				
Soapstone (†).....	\$			74,905		
Sodium carbonate.....	ton					
	\$					
Sodium sulphate.....	ton					
	\$					
Sulphur (x).....	ton			61,728	18,688	
	\$			212,012	186,880	
Talc.....	ton				15,166	
	\$				154,734	
Total Other Non-Metallics.....	\$	1,669,161	204,980	17,547,707	4,308,275	182,782

(†) Includes some talc.

(x) Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and elemental sulphur made from waste smelter gases.

(a) Includes relatively large quantities used as chemical.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1940—Continued

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
NON-METALLICS						
FUELS						
Coal.....ton	1,097,517	6,203,839	1,867,846			17,566,884
.....\$	1,408,540	16,377,959	6,157,250			54,676,993
Natural gas.....M cu. ft.	100,773	27,459,808		1,500		41,232,125
.....\$	30,232	4,923,469		335		13,000,593
Peat.....ton						30
.....\$						75
Petroleum, crude.....bbl.	331	8,362,203		18,633		8,590,978
.....\$	256	10,694,394		37,265		11,160,213
Total Fuels.....\$	1,439,028	31,995,822	6,157,250	37,600		78,837,874
Other Non-Metallic and Industrial Minerals						
Asbestos.....\$						346,805
.....ton						15,619,865
Barytes.....\$			8			338
.....ton			80			4,819
Diatomite.....\$			7			248
.....ton			171			7,957
Feldspar.....\$						21,455
.....ton						187,623
Fluorspar.....\$						4,454
.....ton						59,317
Graphite.....\$						94,033
Grindstones (includes pulpstones, etc.).....ton	Pebbles 33					341
.....\$	165					14,543
Gypsum.....\$			19,987			1,448,788
.....ton			120,043			2,065,933
Iron oxides (ochre).....\$			376			9,979
.....ton			3,948			111,874
Magnesitic-dolomite.....\$						897,016
Magnesium sulphate.....\$						
.....ton						
Mica.....lb.			16,000			1,806,219
.....\$			2,600			237,145
Mineral waters.....Imp. gal.						140,663
.....\$						20,892
Nepheline-syenite.....\$						117,849
Phosphate.....\$						358
.....ton						4,039
Quartz.....\$	159,090					1,858,302
.....\$	55,681					1,203,527
Salt.....\$		6,742				464,714
.....ton		185,430				2,823,269
Silica brick.....M						3,438
.....\$						182,786
Soapstone (†).....\$						74,905
Sodium carbonate.....ton			220			220
.....\$			1,760			1,760
Sodium sulphate.....ton	94,250	10				94,260
.....\$	829,539	50				829,589
Sulphur (x).....ton			90,214			170,630
.....\$			899,126			1,298,018
Talc.....ton						15,166
.....\$						154,734
Total Other Non-Metallics.....\$	885,385	185,480	1,027,728			26,011,498

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces,
1940—Concluded

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS					
CLAY PRODUCTS					
Clay—					
Fireclay.....ton	3,042				
.....\$	9,420				
Bentonite.....ton					710
.....\$					2,023
Brick—					
Soft mud process—					
Face.....M	1,036	1,945	301	12,440	
.....\$	26,965	49,033	3,762	239,379	
Common.....M	4,607	4,659	3,292	14,747	4,636
.....\$	74,786	65,799	31,416	216,979	70,474
Stiff mud process—(wire cut)					
Face.....M	82		15,421	24,547	420
.....\$	1,230		323,525	535,613	8,771
Common.....M	458		36,328	11,700	525
.....\$	5,496		503,084	178,714	7,178
Dry press—					
Face.....M			2,162	11,333	
.....\$			59,494	247,889	
Common.....M			13,880	3,698	
.....\$			239,428	50,000	
Fancy or ornamental brick.....M				47	
.....\$				2,477	
Sewer brick.....M			100	594	
.....\$			1,000	11,222	
Paving brick.....M					
.....\$					
Firebrick.....M	8				
.....\$	412				
Fireclay blocks and shapes.....\$	559				
Structural tile—					
Hollow blocks.....ton	7,282	2,120	43,244	39,406	1,170
.....\$	80,102	18,307	242,599	335,857	10,435
Roofing tile.....\$				791	
Floor tile (quarries).....\$				13,447	
Drain tile.....M	192	56	852	7,912	69
.....\$	5,771	2,364	30,045	183,079	4,025
Sewer pipe, copings, flue linings, etc.....\$	285,740	3,931	111,453	399,212	
Pottery, glazed or unglazed.....\$		31,628		49,853	
Other clay products.....\$	62	683	440	44,028	
Total Clay Products.....\$	490,543	171,745	1,546,246	2,508,540	102,906
OTHER STRUCTURAL MATERIALS					
Cement.....bbl.			3,854,339	2,355,352	572,408
.....\$			5,432,105	3,518,247	1,287,918
Lime—					
Quicklime.....ton	21,685	13,234	197,531	334,471	17,261
.....\$	181,133	111,476	1,307,869	2,340,606	135,326
Hydrated lime.....ton	329	8,002	35,888	38,163	4,906
.....\$	2,961	63,931	172,597	412,181	82,221
Total lime.....ton	22,014	21,236	233,419	372,634	22,167
.....\$	184,094	175,407	1,480,466	2,752,787	217,547
Sand and gravel.....ton	1,440,140	944,033	12,177,624	9,678,745	1,851,645
.....\$	867,490	278,710	3,127,931	4,025,026	839,993
Stone—					
Granite.....ton	87,975	1,326	366,662	529,440	218
.....\$	155,458	69,833	792,708	704,421	4,324
Limestone (a).....ton	24,160	159,812	2,287,384	3,302,596	48,488
.....\$	46,717	206,916	1,854,423	2,649,809	74,116
Marble.....ton			8,767	4,792	
.....\$			50,652	22,157	
Sandstone.....ton	69,316	5,015	92,378	3,446	
.....\$	111,469	33,550	129,179	11,008	
Slate.....ton			639		
.....\$			639		
Total Stone.....ton	181,451	166,153	2,755,830	3,840,274	48,706
.....\$	313,644	310,299	2,827,601	3,387,395	78,440
Total Other Structural Materials.....\$	1,365,228	764,416	12,868,103	13,683,455	2,423,898
Grand Total.....\$	33,318,587	3,435,916	86,313,491	261,483,349	17,828,522
Per cent of total.....	6.29	0.65	16.29	49.35	3.37

(a) Includes relatively large quantities used as a chemical.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1940—Concluded

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS						
CLAY PRODUCTS						
Clay—						
Fireclay.....	ton 1,054		785			4,881
	\$ 10,352		10,792			30,564
Bentonite.....	ton	714	45			1,469
	\$	2,240	225			4,488
Brick—						
Soft mud process—						
Face.....	M 221		3			15,946
	\$ 4,431		64			323,634
Common.....	M 3,275		7,179			42,395
	\$ 41,473		110,823			611,750
Stiff mud process—(wire cut)						
Face.....	M 226	132	724			41,552
	\$ 6,212	2,003	26,282			903,636
Common.....	M 985	1,485	1,296			52,777
	\$ 9,730	11,704	22,510			738,416
Dry press—						
Face.....	M 19	1,212	206			14,932
	\$ 690	16,321	9,323			333,717
Common.....	M	7,292				24,870
	\$	61,907				351,335
Fancy or ornamental brick.....	M					47
	\$					2,477
Sewer brick.....	M					694
	\$					12,222
Paving brick.....			19			19
	\$		819			819
Firebrick.....	M 640	65	2,454			3,167
	\$ 34,710	3,106	127,297			165,525
Fireclay blocks and shapes.....	\$ 64,518		20,050			85,127
Structural tile—						
Hollow blocks.....	ton 1,410	5,437	5,004			105,073
	\$ 12,698	40,329	48,151			788,478
Roofing tile.....	\$		1,048			1,839
Floor tile (quarries).....	\$		184			13,631
Drain tile.....	M 269		1,200			10,550
	\$ 10,217		42,050			277,551
Sewer pipes, copings, flue linings, etc.....	\$ 263,475		88,792			1,152,603
Pottery, glazed or unglazed.....	\$ 381,650		11,321			474,452
Other clay products.....	\$ 25,918		1,152			72,283
Total Clay Products.....	164,828	838,856	520,883			6,344,547
OTHER STRUCTURAL MATERIALS						
Cement.....	bbl. 414,183		363,366			7,559,648
	\$ 832,508		704,567			11,775,345
Lime—						
Quicklime.....	ton 16,421	23,200				623,803
	\$ 145,210	200,138				4,421,758
Hydrated lime.....	ton 451	5,188				92,927
	\$ 4,610	34,396				772,797
Total lime.....	ton 16,872	28,388				716,730
	\$ 149,720	234,534				5,194,555
Sand and gravel.....	ton 1,472,885	1,722,465	2,087,878			31,375,415
	\$ 741,353	1,069,667	809,075			11,759,245
Stone—						
Granite.....	ton 162,126		1,147,747			1,884,410
	\$ 157,666		282,170			6,108,591
Limestone (a).....	ton 3,981		282,095			5,126,075
	\$ 11,999		180			13,739
Marble.....	ton		2,600			75,409
	\$		6,320			176,475
Sandstone.....	ton		20,337			305,543
	\$		474			1,113
Slate.....	ton		6,883			7,522
	\$					
Total Stone.....	ton 3,981	451,270				7,447,665
	\$ 11,999	469,581				7,398,959
Total Other Structural Materials \$	741,353	2,063,894	2,217,757			36,128,104
Grand Total.....	\$ 11,505,858	35,092,337	74,134,485	2,594,157	4,118,333	529,825,035
Per cent of total.....	2.17	6.62	13.99	0.49	0.78	100.00

Table 2.—Quantities and Values of Mineral Products from Canadian Sources, 1939 and 1940

		1939*		1940*	
		Quantity	Value	Quantity	Value
			\$		\$
METALLICS					
Antimony.....	lb.	1,225,585	151,469	2,594,492	396,468
Arsenic (As ₂ O ₃).....	lb.	1,741,917	52,257	2,093,275	62,798
Bismuth.....	lb.	409,449	466,362	58,529	81,004
Cadmium.....	lb.	939,691	662,209	908,127	1,056,152
Chromite.....	tons			335	5,780
Cobalt.....	lb.	732,561	1,213,454	794,359	1,235,220
Copper.....	lb.	608,825,570	60,934,859	655,593,441	65,773,071
Gold valued at standard rate.....	fine oz.	5,094,379	105,310,157	5,311,145	109,791,107
Estimated exchange equalization on gold produced.....			78,805,794		94,687,976
Iron ore.....	short tons	123,598	341,594	414,603	1,211,305
Lead.....	lb.	388,569,550	12,313,768	471,850,256	15,863,605
Manganese ore.....	tons	396	3,688	152	4,315
Mercury.....	lb.	436	1,226	153,830	369,317
Molybdenite concentrates.....	lb.	2,722	816	22,251	10,280
Nickel.....	lb.	226,105,865	50,920,305	245,557,871	59,822,591
Palladium, rhodium, iridium, etc.....	fine oz.	135,402	4,199,622	91,522	3,520,746
Platinum.....	fine oz.	148,902	5,222,589	108,488	4,240,362
Radium and uranium products.....		(a)	1,121,553	(a)	410,176
Selenium.....	lb.	150,771	266,714	179,860	343,533
Silver.....	fine oz.	23,163,629	9,378,490	23,833,752	9,116,172
Tellurium.....	lb.	2,940	4,769	3,491	5,607
Titanium ore.....	tons	3,694	21,267	4,535	24,510
Tungsten concentrates.....	lb.	8,825	4,917	12,002	7,303
Zinc.....	lb.	394,533,860	12,108,244	424,028,862	14,463,624
Total.....			343,506,123		382,503,012
NON-METALLICS—FUELS					
Coal.....	tons	15,537,443	48,315,224	17,566,884	54,676,993
Natural gas.....	M. cu. ft.	35,185,146	12,507,307	41,232,125	13,000,593
Peat.....	tons	445	2,445	30	75
Petroleum, crude.....	brls.	7,826,301	9,846,352	8,590,978	11,160,213
Total.....			70,671,328		78,837,874
OTHER NON-METALLICS					
Asbestos.....	tons	364,472	15,859,212	346,805	15,619,865
Barytes.....	tons	(a)	3,639	338	4,819
Diatomite.....	tons	301	10,388	248	7,957
Feldspar.....	tons	12,500	112,309	21,455	187,623
Fluorspar.....	tons	240	4,995	4,454	59,317
Graphite.....	tons		61,684		94,038
Grindstones.....	tons	304	15,278	341	14,543
Gypsum.....	tons	1,421,934	1,935,127	1,448,788	2,065,933
Iron oxides (ochre).....	tons	6,015	88,418	9,979	111,874
Magnesitic dolomite.....	\$		474,418		897,016
Magnesium sulphate.....	tons	550	9,900		
Mica.....	tons	998	(d)145,221	903	237,145
Mineral water.....	Imp. gals.	123,769	19,105	140,663	20,892
Nepheline syenite.....	\$		140,148		117,849
Phosphate.....	tons	157	1,712	358	4,039
Quartz.....	tons	1,582,935	1,100,214	1,858,302	1,203,527
Salt (b).....	tons	424,500	2,486,632	464,714	2,823,269
Silica brick.....	M	2,493	124,807	3,438	182,786
Soapstone (c).....	\$		41,471		74,905
Sodium carbonate.....	tons	300	2,400	220	1,760
Sodium sulphate.....	tons	71,485	628,151	94,260	829,589
Sulphur**.....	tons	211,278	1,668,025	170,630	1,298,018
Talc.....	tons	13,144	128,595	15,166	154,734
Total.....			25,061,849		26,011,498
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS					
Clay Products—Total.....			5,151,236		6,344,547
OTHER STRUCTURAL MATERIALS					
Cement.....	brls.	5,731,264	8,511,211	7,559,648	11,775,345
Lime (b).....	tons	552,209	4,003,514	716,730	5,194,555
Sand and gravel.....	tons	31,294,341	11,241,102	31,375,415	11,759,245
Stone (b).....	tons	5,443,522	6,455,696	7,447,665	7,398,959
Total.....			30,211,523		36,128,104
Grand Total In Canadian Funds.....			474,602,059		529,825,035

(a) Data not available for publication.

** Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

(b) Includes relatively large quantities used as a chemical material.

* Unless otherwise noted, all total values of mineral production from 1931 to 1940, inclusive, contain estimated exchange equalization on gold produced.

(c) Includes some talc.

(d) Ground mica schist produced in British Columbia not included.

Table 3.—Foreign Exchange Rates, 1940

(Internal Trade Branch)

	Noon Rates at Montreal*					
	Sterling	U.S. Dollar	Swiss Franc	Hong Kong Dollar	Japanese Yen	Argentine Peso (free rate)
1932—December.....	3·7866	1·1544	·2226	·2495	·2423	·2982
1933—December.....	5·0957	·9954	·3022	·3729	·3083	·2874
1934—December.....	4·8865	·9878	·3202	·4189	·2855	·2483
1935—December.....	4·9755	1·0093	·3273	·3240	·2902	·2749
1936—December.....	4·9042	·9993	·2297	·3047	·2850	·2975
1937—December.....	4·9985	1·0004	·2313	·3121	·2910	·2930
1938—December.....	4·7133	1·0092	·2283	·2945	·2747	·2297
1939—December.....	†4·4500	†1·1050	·2490	·2716	·2602	·2527
1940—January.....	†4·4500	†1·1050	·2489	·2736	·2602	·2515
February.....	†4·4500	†1·1050	·2489	·2730	·2602	·2573
March.....	†4·4500	†1·1050	·2489	·2588	·2602	·2598
April.....	†4·4500	†1·1050	·2489	·2425	·2602	·2550
May.....	†4·4500	†1·1050	·2471	·2256	·2602	·2514
June.....	†4·4500	†1·1050	·2491	·2487	·2601	·2438
July.....	†4·4500	†1·1050	·2518	·2620	·2601	·2403
August.....	†4·4500	†1·1050	·2526	·2505	·2601	·2492
September.....	†4·4500	†1·1050	·2528	·2515	·2601	·2575
October.....	†4·4500	†1·1050	·2569	·2566	·2602	·2604
November.....	†4·4500	†1·1050	·2575	·2602	·2602	·2606
December.....	†4·4500	†1·1050	·2575	·2619	·2602	·2614

* Bank of Montreal 1932-34; Bank of Canada 1935-40.

† Since September 16, 1939 quotations used are the average of the daily buying and selling rate set by the Foreign Exchange Control Board. The Current buying and selling rates for sterling are \$4.43 and \$4.47 and for U.S. funds \$1.10 and \$1.11.

PRICE MOVEMENTS, CANADA, 1940

(Internal Trade Branch)

Wholesale and retail prices moved gradually higher during 1940 in continuance of an advance dating from the outbreak of war. The 1940 increase of 4·0 per cent in the cost of living index was slightly in excess of the wholesale price index increase of 3·1 per cent. However, from August 1939 to December 1940, the general wholesale price index rose 16·5 per cent as compared with 7·1 per cent for the cost of living index.

Table 4.—Average Yearly Prices for Metals, 1936-1940

Metal	Market	Unit	1936	1937	1938	1939	1940
			\$	\$	\$	\$	\$
Antimony (ordinaries).....	New York.....	Pound....	0·12240	0·15355	0·12349	0·12359	0·14000
Arsenic, white (nominal).....	New York.....	Pound....	0·035	0·03	0·03000	0·03	0·035
Copper.....	New York.....	Pound....	0·09474	0·13167	0·1000	0·10965	0·11296
	Montreal.....	Pound....	0·10070	0·13886	0·1055	0·1077	0·115
	London.....	Long ton..	42·650	59·339	45·411	49·169	(a)
Gold (in Canadian funds).....		Fine oz....	35·03	34·99	35·175	36·141	38·50
Lead.....	New York.....	Pound....	0·04710	0·06009	0·0474	0·0505	0·0518
	Montreal.....	Pound....	0·04642	0·05799	0·04176	0·04235	0·05
	London.....	Long ton..	17·599	23·326	15·266	15·437	(a)
Nickel.....	New York.....	Pound....	0·35	0·35	0·35	0·35	0·35
Platinum (in Canadian Funds).....	London.....	Fine oz....	40·44	48·45	32·213	35·074	39·086
Silver.....	New York.....	Fine oz....	0·45087	0·44881	0·43225	0·39082	0·34773
Tin.....	New York.....	Pound....	0·46441	0·54337	0·42301	0·50323	0·49827
Zinc.....	St. Louis.....	Pound....	0·04901	0·06519	0·0461	0·0511	0·06335
	Montreal.....	Pound....	0·04153	0·05593	0·039	0·0468	0·052
	London.....	Long ton..	14·920	22·258	13·990	14·950	(a)

NOTE.—All prices in dollars per unit excepting London copper, lead and zinc prices which are quoted in pounds sterling per long ton.

(a) No quotations.

Table 5.—Metal Prices by Months, 1939 and 1940

Month	Copper (Electrolytic)				Pig Lead					
	New York (in cents per pound)		London (In £ sterling per long ton)		Montreal (in cents per pound)		New York (In cents per pound)		London (In £ sterling per long ton)	
	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940
January.....	11.025	11.954	48.440	(a)	3.981	5.0	4.826	5.471	14.534	(a)
February.....	11.025	11.148	47.375	(a)	3.952	5.0	4.805	5.076	14.283	(a)
March.....	11.025	11.160	48.120	(a)	4.013	5.0	4.824	5.192	14.660	(a)
April.....	10.205	11.087	47.833	(a)	3.950	5.0	4.782	5.071	14.337	(a)
May.....	9.833	11.079	47.528	(a)	3.973	5.0	4.750	5.015	14.483	(a)
June.....	9.775	11.128	47.528	(a)	3.998	5.0	4.800	5.000	14.564	(a)
July.....	9.976	10.564	48.863	(a)	4.060	5.0	4.854	5.000	14.753	(a)
August.....	10.261	10.708	50.409	(a)	4.332	5.0	5.043	4.854	16.040	(a)
September.....	11.635	11.296	51.000	(a)	4.600	5.0	5.449	4.929	17.000	(a)
October.....	12.215	11.826	51.000	(a)	4.600	5.0	5.500	5.308	17.000	(a)
November.....	12.275	11.800	51.000	(a)	4.600	5.0	5.500	5.726	17.000	(a)
December.....	12.275	11.802	51.000	(a)	4.760	5.0	5.500	5.500	17.000	(a)
Average.....	10.965	11.296	49.169	(a)	4.235	5.0	5.053	5.179	15.437	(a)

Transported into Canadian funds the average price of copper, based on the London market, was 10.086 cents per pound in 1940 and 10.092 cents in 1939; the average price of lead, based on the same market, was 3.562 cents per pound in 1940 and 3.169 cents in 1939.

(a) No quotations.

Table 5.—Metal Prices by Months, 1939 and 1940—Concluded

Month	Silver				Zinc					
	New York (In cents per oz. .999 fine)		London (In pence per oz. .925 fine)		Montreal (In cents per pound)		St. Louis (In cents per pound)		London (In £ sterling per long ton)	
	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940
January.....	42.750	34.750	20.305	21.892	3.769	5.2	4.500	5.644	13.682	(a)
February.....	42.750	34.750	20.370	20.935	3.800	5.2	4.500	5.534	13.522	(a)
March.....	42.750	34.750	20.280	20.763	3.828	5.2	4.500	5.750	13.728	(a)
April.....	42.750	34.750	20.031	20.713	3.755	5.2	4.500	5.750	13.443	(a)
May.....	42.750	34.949	20.123	21.878	3.790	5.2	4.500	5.803	13.717	(a)
June.....	41.955	34.825	19.505	22.688	3.854	5.2	4.500	6.235	14.023	(a)
July.....	34.944	34.750	16.952	22.095	3.921	5.2	4.516	6.250	14.235	(a)
August.....	35.951	34.750	17.719	23.261	4.041	5.2	4.719	6.389	14.628	(a)
September.....	36.956	34.750	22.178	23.446	4.300	5.2	6.104	6.920	17.250	(a)
October.....	35.726	34.750	22.736	23.451	4.500	5.2	6.500	7.250	17.250	(a)
November.....	34.750	34.750	23.378	23.238	4.500	5.2	6.500	7.250	17.250	(a)
December.....	34.956	34.750	23.263	23.015	4.760	5.2	5.980	7.250	17.250	(a)
Average.....	39.082	34.773	20.570	22.281	4.068	5.2	5.110	6.335	14.950	(a)

The average price of silver in Canadian funds based on the New York market in 1940 was 38.249 cents per fine ounce and in 1939 it was 40.488 cents.

The average price of zinc in Canadian funds based on the London market in 1940 was 3.411 cents per pound in 1939 it was 3.069 cents.

(a) No quotations.

Table 6.—Annual Values of the Mineral Production of Canada since 1886

NOTE.—In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, nickel, silver, zinc, etc., is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued chiefly at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886	10,221,255	2.23	1914	128,863,075	16.75
1887	10,321,331	2.23	1915	137,109,171	17.44
1888	12,518,894	2.67	1916	177,201,534	22.05
1889	14,013,113	2.96	1917	189,646,821	23.18
1890	16,763,353	3.50	1918	211,301,897	25.37
1891	18,976,616	3.92	1919	176,686,390	20.84
1892	16,623,415	3.39	1920	227,859,665	26.40
1893	20,035,082	4.04	1921	171,923,342	19.56
1894	19,931,158	3.98	1922	184,297,242	20.55
1895	20,505,917	4.05	1923	214,079,331	23.41
1896	22,474,256	4.38	1924	209,583,406	22.71
1897	28,485,023	5.49	1925	226,583,333	24.19
1898	38,412,431	7.32	1926	240,437,123	25.61
1899	49,234,005	9.27	1927	247,356,695	25.67
1900	64,420,877	12.04	1928	274,989,487	27.96
1901	65,797,911	12.16	1929	310,850,246	31.00
1902	63,231,836	11.36	1930	279,873,578	27.42
1903	61,740,513	10.83	1931	230,434,726	22.21
1904	60,082,771	10.27	1932	191,228,225	18.20
1905	69,078,999	11.49	1933	221,495,253	20.74
1906	79,286,697	12.81	1934	278,161,590	25.67
1907	86,865,202	13.75	1935	312,344,457	28.56
1908	85,557,101	13.16	1936	361,919,372	32.82
1909	91,831,441	13.70	1937	457,359,092	41.13
1910	106,823,623	14.93	1938	441,823,237	39.42
1911	103,220,994	14.32	1939	474,602,059	41.94
1912	135,048,296	18.33	1940	529,825,035	46.39
1913	145,634,812	19.35			
			Grand Total	8,624,972,304	*755.12

* Based on an estimated population of 11,422,000 in 1940.

NOTE.—For complete data, by minerals, see Annual Mineral Production Report for 1937.

Table 7.—Annual Values of the Mineral Production of Canada, by Classes, since 1929

Year	Metallics	Non-Metallics		Total
		Fuels and other non- metallics	Structural materials and clay products	
	\$	\$	\$	\$
1929	154,454,056	97,861,356	58,534,834	310,850,246
1930	142,743,764	83,402,349	53,727,465	279,873,578
1931	120,920,147	65,346,284	44,158,295	230,434,726
1932	112,041,763	56,788,179	22,398,283	191,228,225
1933	147,015,593	57,782,973	16,696,687	221,495,253
1934	194,110,968	64,763,861	19,286,761	278,161,590
1935	221,800,849	67,328,208	23,215,400	312,344,457
1936	259,425,194	76,723,437	25,770,741	361,919,372
1937	334,165,243	88,324,150	34,869,699	457,359,092
1938	323,075,154	84,869,417	33,878,666	441,823,237
1939	343,506,123	95,733,177	35,362,759	474,602,059
1940	382,503,012	104,849,372	42,472,651	529,825,035

Table 8.—Total (Cumulative) Recorded Production in Canada of Specified Metals to December 31, 1940

		Quantity	Value
			\$
Gold	(a) fine ounces	75,537,057	2,039,101,147
Silver	(b) fine ounces	807,498,741	463,807,309
Copper	(c) pounds	7,353,142,254	879,928,307
Nickel	(d) pounds	3,051,935,610	857,257,188
Lead	(b) pounds	6,845,971,053	305,368,037
Zinc	(f)		195,148,286
Cobalt	(e) pounds	33,858,014	33,157,056

NOTE.—The total value of production by the entire Canadian mining industry from 1886 to the end of 1940 totalled \$8,624,972,304.

(a) Since 1858; (b) since 1887; (c) since 1886; (d) since 1889; (e) since 1904; (f) since 1898.

Table 9.—Values of the Mineral Production of Canada, by Provinces, since 1929

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
	\$	\$	\$	\$	\$
1929.....	30,904,453	2,439,072	46,358,285	117,662,505	5,423,825
1930.....	27,019,367	2,383,571	41,215,220	113,530,976	5,453,182
1931.....	21,081,157	2,176,910	35,964,537	97,975,915	10,057,808
1932.....	16,201,279	2,223,505	25,638,466	85,910,030	9,058,365
1933.....	16,966,183	2,107,682	28,141,482	110,205,021	9,026,951
1934.....	23,310,729	2,156,151	31,269,945	145,565,871	9,776,934
1935.....	23,183,128	2,821,027	39,124,696	158,934,269	12,052,417
1936.....	26,672,278	2,587,791	49,736,919	184,532,892	11,315,527
1937.....	30,314,188	2,763,643	65,160,215	230,042,517	15,751,645
1938.....	26,253,645	3,802,565	68,965,594	219,801,994	17,173,002
1939.....	30,746,200	3,949,433	77,335,998	232,519,948	17,137,930
1940.....	33,318,587	3,435,916	86,313,491	261,483,349	17,828,522

Year	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories
	\$	\$	\$	\$	\$
1929.....	2,253,506	34,739,986	68,162,878	2,905,736	.....
1930.....	2,368,612	30,427,742	54,953,320	2,521,588	.....
1931.....	1,931,880	23,580,901	34,480,701	2,184,917	.....
1932.....	1,681,728	21,174,061	27,326,173	1,993,195	21,423
1933.....	2,477,425	19,702,953	30,794,504	2,041,223	31,829
1934.....	2,977,061	20,228,851	41,206,965	1,628,879	40,204
1935.....	3,816,943	22,289,681	48,692,050	1,302,308	127,938
1936.....	6,970,397	23,305,726	54,407,036	2,220,372	170,834
1937.....	10,271,463	25,597,117	73,555,798	3,784,528	117,978
1938.....	7,782,847	28,966,272	64,549,130	3,959,570	568,618
1939.....	8,794,090	30,691,617	65,216,745	4,961,321	3,248,777*
1940.....	11,505,858	35,092,337	74,134,485	4,118,333	2,594,157*

* Includes value of radium and uranium products; prior to 1939 these data were not available for publication and are not included for the year 1932-1938.

† A relatively small production of silver included with Yukon also some crude petroleum with Alberta.

NOTE.—In the following provincial tables the value of gold includes the exchange equalization. For further information on the price of gold see Chapter II.

Table 10.—Mineral Production of Nova Scotia,* 1938-1940

Product	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Antimony.....
Copper.....
Gold.....
Lead.....
Manganese Ore.....
Silver.....
Tungsten concentrates.....
Zinc.....
NON-METALLICS—						
Barytes.....
Coal.....
Diatomite.....
Fluorspar.....
Grindstones.....
Gypsum.....
Quartz.....
Salt.....
Silica brick.....
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....
Lime—
Quicklime.....
Hydrated lime.....
Sand and gravel.....
Stone.....
Total.....		26,253,645		30,746,200		33,318,587

* Pig iron produced in Nova Scotia from Newfoundland ores totalled 241,856 long tons in 1938; 259,136 long tons in 1939 and 394,412 long tons in 1940.

Table 11.—Mineral Production of New Brunswick, 1938-1940

	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Manganese ore..... tons			392	3,600		
NON-METALLICS—						
Coal..... tons	342,238	1,133,346	468,421	1,566,359	547,064	1,963,012
Grindstones..... tons	175	9,192	152	9,662	255	12,000
Gypsum..... tons	48,418	159,203	29,765	134,286	52,218	192,980
Natural gas..... M cu ft.	577,492	284,689	606,382	292,403	616,041	300,543
Petroleum..... brls.	19,276	27,246	22,799	32,082	22,167	31,220
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....		123,625		129,985		171,745
Lime—						
Quicklime..... tons	9,638	77,149	11,558	97,084	13,234	111,476
Hydrated lime..... tons	5,609	42,407	7,117	54,814	8,002	63,931
Sand and gravel..... tons	3,833,540	1,825,383	3,373,303	1,363,051	944,033	278,710
Stone..... tons	13,279	120,325	75,409	266,107	166,153	310,299
Total.....		3,802,565		3,949,433		3,435,916

Table 12.—Mineral Production of Quebec,* 1938-1940

Product	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃)..... tons					**	
Chromite..... tons					335	5,780
Copper..... lb.	112,645,797	11,233,039	117,238,897	11,831,749	134,166,955	13,532,079
Gold..... fine oz.	881,263	30,998,426	953,377	34,455,998	1,019,175	39,238,238
Lead..... lb.			2,240	600	22,251	10,280
Molybdenite concentrates..... lb.			23,841	42,175	43,510	83,104
Selenium..... lb.	217,952	378,147				
Silver..... fine oz.	1,189,495	517,157	1,167,444	472,675	1,340,450	512,709
Tellurium..... lb.	41,577	71,512	2,940	4,769		
Titanium ore, sold for export..... tons	207	1,449	3,694	21,267	5,535	24,510
Zinc..... lb.	5,315,852	163,356	28,758,759	882,606	27,696,721	944,735
NON-METALLICS—						
Asbestos..... tons	289,793	12,890,195	364,454	15,858,492	346,805	15,619,865
Feldspar..... tons	5,874	62,878	5,399	60,923	8,548	89,004
Iron oxides (ochre)..... tons	5,387	67,209	5,465	82,501	9,603	107,926
Magnetite dolomite.....		420,261		474,418		897,016
Mica..... tons	218	72,982	434	122,243	436	202,583
Natural mineral waters..... Imp. gal.	159,893	19,033	104,629	17,503	109,025	18,466
Phosphate..... tons	208	1,886	157	1,712	358	4,039
Quartz..... tons	85,153	315,251	104,827	369,172	109,090	321,891
Soupsstone†.....		35,038		41,471		74,905
Sulphur..... tons	16,580	98,261	61,476	275,951	61,728	212,012
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	2,730,320	3,693,188	3,027,759	4,035,294	3,854,339	5,432,105
Clay products.....		1,022,194		1,274,776		1,546,246
Lime—						
Quicklime..... tons	109,706	707,481	134,331	844,055	197,531	1,307,869
Hydrated lime..... tons	27,608	135,850	26,781	139,017	35,888	172,597
Sand and gravel..... tons	12,523,404	3,532,873	10,050,955	2,703,032	12,177,624	3,127,931
Stone..... tons	2,196,384	2,527,928	2,528,355	3,323,599	2,755,830	2,327,601
Total.....		68,965,594		77,335,998		86,313,491

* There is also in this province an important production of aluminium from imported ores.

† Includes some talc.

** Arsenic ore was shipped from a gold mine for experimental purposes.

Table 13.—Mineral Production of Ontario,* 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃).....lb.	2,175,646	56,538	1,741,917	52,257	2,093,275	62,798
Bismuth.....lb.	9,516	9,754			17,789	24,620
Chromite.....tons						
Cobalt.....lb.	459,226	790,913	732,561	1,213,454	794,359	1,235,220
Copper.....lb.	309,030,106	30,405,500	328,429,665	32,637,305	347,931,013	34,742,229
Gold.....fine oz.	2,896,477	101,883,578	3,086,076	111,533,873	3,261,688	125,574,988
Iron ore.....short tons			123,598	341,594	414,603	1,211,305
Lead.....lb.	22,363	748	39,130	1,240	345,455	11,614
Molybdenite (concentrates).....lb.	14,000	4,500	482	216		
Nickel.....lb.	210,572,738	53,914,494	226,105,865	50,920,305	245,557,871	59,822,591
Palladium, rhodium, etc.....fine oz.	130,893	3,677,342	135,402	4,199,622	91,522	3,520,746
Platinum.....fine oz.	161,310	5,196,279	148,877	5,221,712	108,464	4,239,424
Selenium.....lb.	54,577	94,691	126,930	224,539	136,350	260,429
Silver.....fine oz.	4,318,837	1,877,701	4,689,422	1,898,653	5,563,101	2,127,831
Tellurium.....lb.					3,491	5,607
Tungsten concentrates.....lb.					1,064	690
Zinc.....lb.						
Non-METALLICS—						
Asbestos.....tons			18	720		
Barytes.....tons				3,639	305	4,577
Diatomite.....tons			5	280		
Feldspar.....tons	8,106	65,964	7,061	51,056	12,907	98,619
Fluorspar.....tons	217	3,906	240	4,995	4,437	58,952
Graphite.....tons		41,590		61,684		94,038
Gypsum.....tons	57,503	242,470	59,440	260,792	75,271	313,512
Mica.....tons	253	6,445	564	22,978	458	31,962
Natural mineral waters.....Imp. gal.	28,416	2,586	19,140	1,602	31,638	2,426
Natural gas.....M cu. ft.	10,952,806	6,460,764	11,966,581	7,261,928	13,053,403	7,745,834
Nepheline syenite.....\$		142,737		140,148		117,849
Peat.....tons	620	3,500	445	2,445	30	75
Petroleum.....brls.	172,641	359,268	206,379	401,430	187,644	397,078
Quartz (a).....tons	1,173,259	597,037	1,333,342	665,148	1,581,367	810,285
Salt.....tons	388,130	1,637,140	370,843	2,200,189	412,401	2,371,780
Silica brick.....M	595	50,592	603	49,595	629	62,661
Sulphur†.....tons	16,897	168,970	16,126	161,260	18,688	186,880
Talc.....tons	10,853	109,810	13,144	128,595	15,166	154,734
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	1,818,032	2,555,214	1,709,263	2,437,777	2,355,352	3,518,247
Clay products.....		2,083,496		2,346,638		2,508,540
Lime—						
Quicklime.....tons	242,629	1,692,227	268,622	1,870,035	334,471	2,340,606
Hydrated lime.....tons	27,849	297,032	33,637	366,917	38,163	412,181
Sand and gravel.....tons	8,531,281	3,046,043	9,350,216	3,537,216	9,678,745	4,025,026
Stone.....tons	2,513,291	2,323,165	2,437,594	2,298,111	3,840,274	3,387,395
Total.....		219,801,994		232,519,948		261,483,349

† Sulphur content of pyrites shipped and estimated sulphur salvaged from smelter gases.

(a) Includes low grade silica sand for fluxing purposes since 1936.

* The total production of blast-furnace pig iron in Ontario, chiefly from foreign ores and scrap, in 1938 was 463,571 long tons; in 1939 it was 496,595 long tons and in 1940 a total of 774,427 long tons.

Table 14.—Mineral Production of Manitoba, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....lb.	115,166	92,543	73,830	52,029	57,742	67,154
Copper.....lb.	65,582,772	6,539,914	70,458,890	7,110,711	75,267,937	7,591,524
Gold.....fine oz.	185,706	6,532,209	180,875	6,537,003	152,295	5,863,357
Selenium.....lb.	57,788	100,262	†	†	†	†
Silver.....fine oz.	1,198,315	520,991	1,028,485	416,413	1,033,512	395,308
Tellurium.....lb.	4,454	7,661	†	†	†	†
Zinc.....lb.	46,864,575	1,440,148	40,302,747	1,236,891	35,103,373	1,197,376
Non-METALLICS—						
Coal.....tons	2,016	5,660	1,138	3,110	1,697	4,037
Feldspar.....tons	78	451	40	330		
Gypsum.....tons	14,571	92,129	15,961	98,578	23,108	137,051
Lithium minerals.....\$		150	600	180	600	180
Natural gas.....M cu. ft.	600					
Salt.....tons	2,920	34,979	2,453	35,888	3,076	45,731
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	330,889	754,427	343,717	773,363	572,408	1,287,918
Clay products.....		105,334		78,892		102,906
Lime—						
Quicklime.....tons	15,600	124,763	15,625	119,696	17,261	135,326
Hydrated lime.....tons	4,224	73,922	4,407	76,494	4,906	82,221
Sand and gravel.....tons	1,216,084	645,812	1,363,593	514,404	1,851,645	839,993
Stone.....tons	39,378	101,617	36,143	83,948	48,706	78,440
Total		17,173,002		17,137,930		17,828,522

† No commercial recovery reported.

Table 15.—Mineral Production of Saskatchewan, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....lb.	73,630	59,166	66,608	46,939	71,594	83,264
Copper.....lb.	18,156,157	1,810,532	18,133,149	1,829,997	20,484,954	2,066,112
Gold.....fine oz.	50,021	1,759,489	77,120	2,787,194	102,925	3,962,613
Selenium.....lb.	28,612	49,642	†	†	†	†
Silver.....fine oz.	898,413	390,603	1,141,600	462,211	1,691,540	646,997
Tellurium.....lb.	2,206	3,794	†	†	†	†
Zinc.....lb.	29,962,597	920,751	37,278,001	1,144,062	44,452,595	1,516,278
Coal.....tons	1,022,166	1,380,416	959,595	1,255,142	1,097,517	1,408,540
Grinding pebbles.....tons					33	165
Quartz (a).....tons	116,898	40,914	134,192	46,967	159,090	55,681
Salt.....tons						
Sodium sulphate.....tons	62,920	552,180	71,455	627,965	94,250	829,539
Natural gas.....M cu. ft.	90,285	34,136	96,423	36,640	100,773	30,232
Petroleum crude.....bbl.					331	256
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....tons		118,713		148,774		164,828
Sand and gravel.....tons	1,037,753	662,511	1,913,995	408,199	1,472,885	741,353
Total		7,782,847		8,794,090		11,505,858

(a) Low grade silica sand for fluxing purposes.

† No commercial recovery reported.

Table 16.—Mineral Production of Alberta, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold..... fine oz.	305	10,728	359	12,974	215	8,277
Silver..... fine oz.	23	10	32	13	20	8
Non-METALLICS—						
Bituminous sands..... tons	(a)	(a)	(a)	(a)	(a)	(a)
Coal..... tons	5,251,233	13,698,470	5,519,208	14,415,281	6,203,839	16,377,959
Natural gas..... M cu. ft.	21,822,108	4,807,346	22,513,660	4,915,821	27,459,808	4,923,469
Petroleum..... brls.	6,751,312	8,775,094	7,576,932	9,362,363	8,362,203	10,694,394
Salt..... tons	4,045	46,035	3,319	37,526	6,742	185,430
Sodium sulphate..... tons	89	1,127	30	186	10	50
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	304,373	611,790	377,846	744,357	414,183	832,508
Clay Products.....		377,337		461,079		838,856
Lime—						
Quicklime..... tons	11,744	103,922	12,113	104,772	16,421	145,210
Hydrated lime..... tons	309	3,090	386	3,860	451	4,510
Sand and gravel..... tons	792,760	525,175	817,168	619,105	1,722,465	1,069,667
Stone..... tons	1,691	6,148	3,048	14,280	3,981	11,999
Total.....		28,966,272		30,691,617		35,092,337

(a) Included with petroleum refining.

Table 17.—Mineral Production of British Columbia, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Antimony..... lb.			1,224,385	151,321	2,594,492	396,468
Bismuth..... lb.			409,449	466,362	40,740	56,384
Cadmium..... lb.	510,342	410,090	799,253	563,241	773,791	905,734
Copper..... lb.	65,759,265	6,557,514	73,253,408	7,392,734	772,582	7,841,117
Gold..... fine oz.	605,617	21,302,578	626,970	22,659,323	617,011	23,754,924
Lead..... lb.	413,706,307	13,834,339	378,440,666	11,992,784	466,849,112	15,695,467
Mercury..... lb.	760	760	436	1,226	153,830	369,317
Nickel..... lb.						
Platinum..... fine oz.	16	515	25	877	24	938
Silver..... fine oz.	11,186,563	4,863,582	10,648,081	4,311,175	11,885,556	4,546,106
Tungsten concentrates..... lb.			8,825	4,917	2,352	1,387
Zinc..... lb.	299,363,564	9,199,443	279,041,497	8,563,784	312,020,671	10,643,025
Non-METALLICS—						
Barytes..... tons					8	80
Coal..... tons	1,440,287	5,237,077	1,537,905	5,464,061	1,867,846	6,157,250
Diatomite..... tons	14	362	17	447	7	171
Grindstones, pulpstones..... tons						
Gypsum..... tons	17,451	100,080	18,150	100,641	19,987	120,043
Iron oxides (ochre)..... tons	434	4,560	550	5,917	376	3,948
Magnesium sulphate..... tons	470	9,400	550	9,900		
Mica (schist)..... tons	48	1,562	(a)	(a)	8	2,600
Sodium carbonate..... tons	252	2,268	300	2,400	220	1,760
Sulphur*..... tons	78,918	777,586	133,676	1,230,814	90,214	899,126
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	335,488	626,731	272,679	520,420	363,366	704,567
Clay products.....		365,132		371,140		520,883
Lime—						
Quicklime..... tons	14,518	140,347	18,035	165,036	23,200	200,133
Hydrated lime..... tons	5,137	33,814	4,816	32,223	5,188	34,396
Sand and gravel..... tons	2,211,682	751,491	2,284,995	870,268	2,087,878	809,075
Stone..... tons	288,337	329,899	313,138	335,734	451,270	469,581
Total.....		64,549,130		65,216,745		74,134,485

* Includes sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

(a) Data not available for publication.

Table 18.—Mineral Production of Yukon, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold.....fine oz.	72,368	2,545,544	87,745	3,171,192	80,458	3,097,633
Lead.....lb.	5,198,990	173,854	7,544,632	239,089	4,655,689	156,524
Silver.....fine oz.	2,844,659	1,236,772	3,830,864	1,551,040	2,259,343	864,176
NON-METALLICS—						
Coal.....tons	361	3,400				
Total.....		3,959,570		4,961,321		4,118,333

Table 19.—Mineral Production of Northwest Territories, 1938-1940

Products	1938		1939		1940	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
Copper.....lb.	75,567	7,535	42,382	4,277		
Gold.....oz.	6,800	239,190	51,914	1,876,224	55,159	2,123,621
Radium and uranium products.....	(a)	(a)	(a)	1,121,553	(a)	410,176
Natural gas.....M cu. ft.	1,500	335	1,500	335	1,500	335
Silver.....fine oz.	581,902	252,993	483,874	195,911	59,505	22,760
Petroleum, crude.....brls.	22,855	68,565	20,191	50,477	18,633	37,265
Total.....		568,618		3,248,777		2,594,157

(a) Data not available for publication.

In 1937 shipments from the mine consisted of 396.3 tons of pitchblende-silver concentrates and 169.8 tons of silver-copper concentrates, the total value of finished products of radium, uranium, and silver amounted to \$850,000 according to the 1937 annual printed report of the Eldorado Gold Mines Ltd.

During 1938 there were 689 tons of pitchblende-silver concentrates valued at \$1,560,824 shipped from the mine to the Port Hope refinery and 104 tons of copper-silver concentrates valued at \$32,649 shipped to Tacoma, Wash. The silver content of all Eldorado shipments is included under silver for the years shown.

NOTE.—For complete data relating to Canadian Mineral Production, by Provinces, see Annual Mineral Production Report for 1938.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1936-1940

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material) \$	Number of employees	Salaries and wages \$	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
Metal Mining Industries							
ALLUVIAL GOLD MINES							
1936.....	80	85	10,965,524	853	1,519,659	166,574	2,893,981
1937.....	106	109	11,919,937	1,069	1,689,911	176,560	3,066,636
1938.....	111	113	12,846,973	1,071	2,056,936	288,370	3,753,052
1939.....	98	104	9,844,524	830	1,439,765	318,613	4,204,974
1940.....	125	126	9,933,894	840	1,680,779	298,680	3,820,169
AURIFEROUS QUARTZ MINES							
1936.....	580	607	256,018,578	25,097	39,826,742	19,882,784	88,210,233
1937.....	631	659	269,145,649	29,140	48,219,318	24,714,827	97,961,278
1938.....	535	550	251,203,802	29,647	50,462,092	28,674,805	114,472,106
1939.....	455	474	248,692,569	30,622	53,206,225	30,380,927	129,633,245
1940.....	428	438	250,919,160	31,405	55,205,096	32,076,741	146,713,744
COPPER-GOLD-SILVER MINES							
1936.....	26	27	40,732,717	3,738	5,473,325	3,652,068	15,619,897
1937.....	35	38	73,338,258	5,164	8,240,614	15,832,950	24,902,851
1938.....	37	39	65,416,729	5,577	8,921,465	20,544,691	28,795,192
1939.....	28	30	58,867,620	6,083	9,920,591	24,978,891	26,182,577
1940.....	25	26	60,446,948	6,115	10,777,827	25,370,357	25,804,419
SILVER-COBALT MINES							
1936.....	24	25	5,946,702	363	458,546	181,592	915,376
1937.....	23	25	2,655,060	300	394,386	312,624	540,762
1938.....	34	30	2,696,217	297	386,851	446,070	288,293
1939.....	36	43	2,461,556	323	412,728	237,096	653,032
1940(e).....	48	44	337,080	123	158,024	57,347	809,263
SILVER-LEAD-ZINC MINES							
1936.....	88	89	19,372,600	1,870	2,917,832	1,894,495	13,814,645
1937.....	128	130	29,637,739	2,220	3,914,643	5,185,229	22,740,582
1938.....	107	108	30,386,714	1,640	3,027,915	5,068,253	18,483,945
1939.....	82	83	23,664,620	1,646	2,803,057	4,699,242	13,555,609
1940.....	82	83	19,969,198	1,585	3,052,532	4,380,568	16,439,530
NICKEL-COPPER MINES							
1936.....	5	9	30,131,192	4,406	7,331,542	4,102,807	18,710,379
1937.....	8	11	33,979,540	5,462	10,193,491	5,185,229	25,812,659
1938.....	8	11	35,363,940	5,342	9,916,179	5,174,237	25,491,028
1939.....	4	7	35,307,319	5,759	10,960,710	6,117,331	32,259,124
1940.....	3	6	36,765,154	6,872	12,256,863	6,783,621	34,240,489
MISCELLANEOUS METAL MINES							
1936.....	11	11	770,957	113	142,974	30,345	3,147
1937.....	15	15	1,320,012	121	155,191	33,385	52,655
1938.....	19	19	1,380,035	129	145,551	16,906	-7,997
1939.....	31	31	3,074,999	331	455,278	175,573	349,404
1940.....	36	36	2,720,642	445	628,025	720,173	1,309,105
NON-FERROUS METAL SMELTING AND REFINING							
1936.....	11	14	143,858,717	10,015	14,346,050	(b)158,460,775	† 71,276,645
1937.....	10	13	162,696,595	11,570	17,990,947	(b)216,470,386	† 101,807,865
1938.....	10	13	184,337,126	12,788	19,549,963	(b)200,204,359	† 87,091,374
1939.....	9	13	192,186,465	12,449	19,372,119	(b)182,544,662	† 80,057,833
1940.....	9	13	234,826,742	13,466	21,766,197	(b)207,301,259	† 98,059,288
Total Metal Mining Industries							
1936.....	825	867	507,796,987	46,455	72,016,670	188,371,440	211,444,393
1937.....	956	1,000	584,692,790	55,046	90,798,501	268,514,346	276,885,288
1938.....	861	883	583,631,536	56,491	94,466,952	260,417,691	278,367,293
1939.....	743	785	574,099,672	58,043	98,570,473	249,452,335	286,895,798
1940.....	756	772	615,918,818	60,351	105,525,343	276,988,746	327,196,007

*Contains data relating to silver-pitchblende ores in the Northwest Territories. †Value added by smelting.

(b) Includes fuel and electricity used for metallurgical purposes and cost of ores treated which were \$137,857,432 in 1936, \$191,303,251 in 1937, \$173,070,377 in 1938, \$154,879,498 in 1939 and \$174,274,655 in 1940.

(c) See foot note at end of this table.

(d) See end of table.

(e) The large decrease in capital employed in the Silver-Cobalt industries in 1940 resulted largely from the leasing of the O'Brien mine and the cessation of mining operations by M. J. O'Brien Ltd. Delinquent returns, received after completion of these totals show 83 employees receiving \$88,105 in salaries and wages in the Silver-Cobalt Industry also capital was increased by \$154,109.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1936-1940—Continued

1 Year	2 Number of active firms	3 Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	4 Capital employed (excluding ore reserves or other unmined material) \$	5 Number of employees	6 Salaries and wages \$	7 Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	8 Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
Total Non-Metal Mining Industries, including Fuels							
*FUELS							
COAL							
1936.....	516	553	109,703,043	26,918	28,873,135	8,088,154	34,852,621
1937.....	480	503	118,273,848	27,202	31,641,679	8,717,711	37,261,013
1938.....	462	498	111,495,137	27,074	28,699,781	7,926,328	34,207,513
1939.....	467	510	109,072,484	26,472	30,720,991	8,203,815	38,062,870
1940.....	491	527	103,634,890	26,434	34,043,162	8,996,231	43,552,679
NATURAL GAS							
1936.....	227	3,253	77,666,568	2,075	2,456,918	79,034	9,062,657
1937.....	218	3,268	75,611,107	2,028	2,488,125	98,880	8,938,446
1938.....	218	3,325	79,143,830	1,966	2,506,121	82,887	9,748,677
1939.....	222	3,352	78,409,338	1,990	2,536,220	98,397	10,634,146
1940.....	236	3,438	80,487,766	2,189	2,748,740	94,354	11,108,749
PETROLEUM							
1936.....	256	2,266	33,289,876	1,052	1,298,592	510,016	3,439,317
1937.....	280	2,328	42,147,521	1,620	2,340,359	1,109,966	4,892,672
1938.....	310	2,400	51,685,038	1,894	2,656,112	1,141,762	8,986,071
1939.....	348	2,389	52,102,077	1,780	2,567,983	1,432,055	9,310,922
1940.....	300	2,360	53,216,853	1,741	2,835,410	1,467,995	10,018,083
TOTAL FUELS							
1936.....	999	6,072	220,659,487	30,045	32,628,645	8,677,204	47,354,595
1937.....	978	6,099	236,032,476	30,850	36,470,163	9,926,557	51,092,131
1938.....	990	6,223	242,324,005	30,934	33,862,014	9,150,977	52,942,261
1939.....	1,037	6,251	239,563,899	30,242	35,825,194	9,734,267	58,007,938
1940.....	1,027	6,325	237,339,509	30,364	39,627,312	10,558,580	64,679,511
OTHER NON-METAL MINING INDUSTRIES							
ABRASIVES—NATURAL							
1936.....	8	8	77,279	30	17,442	3,528	34,846
1937.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1938.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1939.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
1940.....	(a)	(a)	(a)	(a)	(a)	(a)	(a)
ASBESTOS							
1936.....	10	11	18,877,326	2,647	2,642,924	2,399,475	7,558,708
1937.....	10	11	21,249,676	3,842	4,232,507	4,076,235	10,429,556
1938.....	8	9	22,008,771	3,711	4,024,363	3,187,725	9,702,470
1939.....	8	9	22,489,233	3,784	4,347,064	3,463,513	12,395,699
1940.....	8	9	19,799,280	3,886	4,728,702	3,720,968	11,903,688

*Production of peat since 1929 included in the miscellaneous non-metallics.

(c) See footnote at end of this table.

(a) Included with miscellaneous.

(d) See footnote at end of table.

DOMINION BUREAU OF STATISTICS

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries,
1936-1940—Continued

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
OTHER NON-METAL MINING INDUSTRIES—Continued							
FELDSPAR, QUARTZ, AND NEPHELINE SYENITE							
1936.....	34	34	1,400,024	324	238,848	160,913	628,769
1937.....	39	39	1,352,992	445	384,698	186,470	1,242,244
1938.....	32	32	1,605,136	375	342,248	168,509	1,065,138
1939.....	43	43	1,591,015	338	330,170	178,721	1,173,950
1940.....	44	46	2,174,258	400	377,254	214,517	1,294,482
GYPSUM							
1936.....	9	14	8,954,654	514	440,297	218,869	1,060,102
1937.....	8	13	6,902,222	602	595,396	263,077	1,277,406
1938.....	9	15	7,325,412	623	528,027	239,306	1,262,959
1939.....	10	17	6,806,907	714	692,158	299,319	1,635,808
1940.....	9	16	4,648,662	694	717,666	418,339	1,647,594
IRON OXIDES (OCHRE)							
1936.....	6	6	167,499	39	30,281	11,419	58,211
1937.....	6	6	213,248	50	35,368	13,878	69,762
1938.....	6	6	200,057	37	31,557	8,124	63,645
1939.....	7	7	215,445	38	26,916	8,194	80,224
1940.....	7	7	195,263	46	38,842	18,033	93,841
MICA							
1936.....	22	22	221,800	101	44,550	4,824	69,732
1937.....	34	34	150,569	199	97,547	17,546	116,185
1938.....	40	40	159,758	156	74,424	19,247	61,742
1939.....	61	61	230,337	224	112,653	19,014	128,307
1940.....	65	65	259,168	218	134,705	27,829	209,316
SALT							
1936.....	9	9	3,856,187	506	640,644	212,697	1,560,447
1937.....	9	9	4,001,568	543	653,136	259,064	1,540,401
1938.....	9	9	4,270,799	562	786,720	309,080	1,603,833
1939.....	9	9	4,447,204	547	741,736	178,778	2,173,204
1940.....	9	9	4,993,914	586	836,506	180,768	2,461,482
TALC AND SOAPSTONE							
1936.....	7	7	647,929	85	70,935	33,392	143,878
1937.....	7	7	625,497	83	72,020	25,394	138,420
1938.....	6	6	212,491	75	59,426	23,907	120,941
1939.....	6	6	239,835	65	60,512	22,332	147,734
1940.....	8	8	319,398	94	80,879	37,130	192,509
MISCELLANEOUS							
1936.....	41	41	2,195,621	477	526,248	548,434	1,006,194
1937.....	53	53	3,050,376	530	658,723	550,872	1,136,445
1938.....	50	50	2,787,671	394	475,567	409,229	779,093
1939.....	46	47	3,128,035	465	539,143	394,357	964,565
1940.....	46	46	2,491,527	547	703,501	608,028	1,508,728

(c) See footnote at end of this table.

(d) See footnote at end of this table.

† Includes natural abrasives data for first time.

‡ Value of containers is included from 1939.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1936-1940—Continued

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$

TOTAL OTHER NON-METAL MINING INDUSTRIES—Concluded

1936.....	146	152	36,398,319	4,723	4,652,169	3,593,551	12,120,887
1937.....	166	172	37,546,148	6,294	6,729,395	5,392,536	15,960,419
1938.....	160	167	38,670,095	5,933	6,322,332	4,365,127	14,669,821
1939.....	190	199	39,148,011	6,175	6,850,352	5,170,228	18,699,491
1940.....	196	206	34,881,470	6,471	7,618,055	5,905,612	19,311,640

Total Non-Metal Mining Industries, including Fuels

1936.....	1,145	6,224	257,057,806	34,768	37,280,814	12,270,755	59,475,482
1937.....	1,144	6,271	273,578,624	37,144	43,199,558	15,319,093	67,042,550
1938.....	1,150	6,390	280,894,100	36,867	40,181,346	13,516,104	67,602,082
1939.....	1,227	6,450	278,731,910	36,417	42,675,546	14,904,495	76,707,429
1940.....	1,223	6,531	272,220,979	36,835	47,245,367	16,464,192	83,991,151

Clay Products and Other Structural Materials

CLAY PRODUCTS

Brick, Tile and Sewer Pipe

1936.....	129	136	19,487,227	1,651	1,297,395	747,183	2,506,008
1937.....	131	137	20,087,448	2,159	2,002,075	1,121,754	3,163,758
1938.....	140	147	17,756,732	2,125	2,009,836	1,039,148	3,284,486
1939.....	133	141	17,614,307	2,055	2,072,351	1,093,160	3,852,837
1940.....	132	136	16,569,424	2,343	2,488,390	1,402,681	4,581,541

STONEWARE AND POTTERY

1936.....	4	4	376,204	124	100,753	19,171	198,665
1937.....	6	6	339,784	128	92,717	14,569	216,778
1938.....	5	5	311,810	117	100,397	14,701	197,749
1939.....	8	8	326,435	110	89,337	14,338	190,901
1940.....	7	7	577,019	214	186,861	19,547	340,778

TOTAL CLAY PRODUCTS *

1936.....	133	140	19,863,431	1,775	1,498,148	766,354	2,704,673
1937.....	137	143	20,427,232	2,287	2,094,792	1,136,323	3,380,536
1938.....	145	152	18,068,542	2,242	2,110,233	1,063,849	3,482,255
1939.....	141	149	17,940,742	2,165	2,161,688	1,107,498	4,043,798
1940.....	139	143	17,146,443	2,557	2,676,251	1,422,228	4,922,319

OTHER STRUCTURAL MATERIALS †

CEMENT

1936.....	4	9	53,343,991	1,052	1,196,664	2,169,071	4,739,121
1937.....	4	9	54,150,672	1,083	1,373,444	2,445,333	6,650,534
1938.....	3	8	52,299,046	1,034	1,306,331	2,293,584	5,947,766
1939.....	3	8	51,251,358	1,001	1,297,542	2,238,039	6,273,172
1940.....	3	8	50,370,276	1,052	1,515,766	4,291,221	8,715,422

(c) See footnote at end of this table.

(d) See footnote at end of this table.

* Includes kaolin and other clays.

† A considerable proportion of the values shown for lime and stone sales represents shipments for chemical purposes—see Chapter 9.

Table 20.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1936-1940—Concluded

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
OTHER STRUCTURAL MATERIALS—Concluded							
LIME							
1936.....	52	57	6,106,901	799	640,322	839,979	2,495,991
1937.....	52	57	4,931,831	872	781,274	1,038,958	2,785,959
1938.....	48	53	4,881,214	867	795,068	939,989	2,602,663
1939.....	54	59	4,802,983	937	849,468	1,052,012	2,951,502
1940.....	50	55	5,107,739	962	1,003,671	1,601,546	3,593,009
SAND AND GRAVEL							
1936.....	1,356	5,374	2,994,127	3,638	2,090,388	101,059	6,820,340
1937.....	1,560	7,373	6,706,288	6,084	3,468,471	295,348	10,197,348
1938.....	1,339	6,094	3,286,340	6,959	4,482,916	254,595	11,747,959
1939.....	1,403	6,215	2,735,690	6,120	3,981,913	274,509	10,966,593
1940.....	1,458	5,596	3,456,502	4,243	3,744,585	291,008	11,468,237
STONE							
1936.....	426	558	11,899,852	2,512	2,043,216	841,704	4,292,449
1937.....	418	555	12,857,537	2,898	2,576,344	1,085,548	5,853,812
1938.....	429	550	11,187,274	2,815	2,298,154	890,350	4,665,676
1939.....	452	573	12,213,030	3,076	2,818,578	1,081,884	5,393,812
1940.....	482	560	12,127,271	2,886	2,779,703	1,204,375	6,194,584
TOTAL OTHER STRUCTURAL MATERIALS							
1936.....	1,838	5,998	74,344,871	8,001	5,970,590	3,951,813	18,347,901
1937.....	2,034	7,994	78,646,338	10,937	8,199,533	4,865,187	25,487,653
1938.....	1,819	6,705	71,653,874	11,675	8,832,469	4,378,518	24,964,064
1939.....	1,912	6,855	71,003,061	11,134	9,045,501	4,648,444	25,585,079
1940.....	1,993	6,219	71,061,738	9,143	9,043,725	7,838,150	29,971,252
Total Clay Products and Other Structural Materials							
1936.....	1,971	6,138	94,208,302	9,776	7,468,738	4,718,167	21,052,574
1937.....	2,171	8,137	99,073,560	13,224	10,294,325	6,001,510	28,868,189
1938.....	1,964	6,857	89,722,416	13,917	10,992,702	5,432,367	28,446,299
1939.....	2,053	7,004	88,943,803	13,299	11,107,189	5,753,942	29,628,817
1940.....	2,132	6,362	88,208,231	11,700	11,718,976	8,810,378	34,893,571
GRAND TOTAL OF ALL INDUSTRIES							
1936.....	3,941	13,229	859,063,095	90,999	116,766,222	205,360,362	291,972,359
1937.....	4,271	15,408	957,344,974	105,414	144,292,354	289,834,949	372,796,027
1938.....	3,975	14,130	934,248,052	107,275	145,644,000	279,366,162	374,415,674
1939.....	4,023	14,239	941,775,355	107,759	152,353,298	270,110,772	393,232,044
1940.....	4,111	13,665	976,348,028	108,886	164,498,686	302,263,316	446,080,729

(c) The value of fuel, purchased electricity and process supplies used was deducted from the gross value of shipments for the first time in 1935; this was done in order to attain a more accurate approximation of a net value. Also the cost of ores, etc., treated in non-ferrous metallurgical plants is deducted in determining the figure "value added"; these costs were as follows: 1936, \$137,857,432; 1937, \$191,303,251; 1938, \$173,070,377; 1939, \$154,879,498; 1940, \$174,274,655 (d) The cost of freight and treatment charges were deducted by the shipper of metal bearing ores for all years prior to 1937; since 1937 the costs of freight and treatment charges were reported separately and deducted at the Bureau of Statistics.

NOTE.—The net value as given in column 8 represents the **gross value** as given by the operator less the cost of items indicated in column 7.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1936-1940

1 Year	2 Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	3 Capital employed (excluding ore reserves or other unmined material) \$	4 Number of employees	5 Salaries and wages \$	6 Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d) \$	7 Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*) \$
(c) NOVA SCOTIA						
1936	365	55,513,999	15,368	15,980,687	5,645,436	19,136,304
1937	1,210	59,114,458	15,629	18,373,958	6,076,253	22,597,547
1938	810	52,594,162	15,591	15,959,095	5,258,556	20,224,347
1939	914	52,580,559	15,202	17,371,518	5,450,671	23,504,419
1940	666	48,086,422	14,934	19,285,662	6,041,154	26,189,233
NEW BRUNSWICK						
1936	423	5,253,829	1,744	1,248,431	242,114	2,324,747
1937	423	4,676,203	3,012	1,509,063	293,867	2,442,101
1938	409	4,310,273	3,042	2,074,273	273,978	3,506,250
1939	426	4,466,757	3,263	2,311,835	329,538	3,600,454
1940	423	4,522,307	2,240	1,939,160	376,192	3,024,317
QUEBEC						
1936	4,011	140,537,708	14,225	15,774,362	48,436,955	44,823,567
1937	5,120	181,868,872	19,121	22,708,131	67,723,503	60,872,828
1938	4,161	179,013,810	20,829	24,485,254	79,226,191	69,593,807
1939	4,137	179,371,057	20,872	25,689,382	81,840,188	81,600,118
1940	3,857	213,363,729	21,726	29,025,418	93,034,012	98,134,979
ONTARIO						
1936	6,297	384,535,666	31,105	46,899,805	108,353,709	151,874,462
1937	6,343	389,129,937	36,238	58,891,339	145,830,800	190,447,576
1938	6,342	389,031,046	35,791	58,926,900	136,143,954	181,897,886
1939	6,380	397,025,573	37,233	63,220,042	119,307,190	188,867,969
1940	6,399	405,063,185	38,774	66,395,845	135,879,424	209,277,055
MANITOBA						
1936	274	41,722,791	2,932	3,752,367	7,307,942	9,366,496
1937	275	55,815,784	3,159	4,301,366	14,293,086	13,415,841
1938	276	44,564,907	2,840	4,393,270	14,478,826	15,144,672
1939	260	36,516,216	3,027	4,541,992	16,217,955	12,401,404
1940	136	39,640,423	3,145	5,107,054	16,016,832	14,065,270
SASKATCHEWAN						
1936	219	14,974,371	1,828	1,937,825	3,826,763	5,720,747
1937	248	22,037,133	2,307	2,372,443	7,376,254	8,226,326
1938	269	18,695,606	2,287	2,470,530	5,345,294	7,029,842
1939	258	18,838,439	2,026	2,347,264	6,749,197	6,391,404
1940	252	17,008,171	1,961	2,573,878	7,033,060	8,652,006

Plants in the provinces do not add to Canada total, owing to the fact that a plant located in the Manitoba-Saskatchewan boundary is counted but once.

*See footnote, preceding table.

(b) Includes fuel and electricity used for metallurgical purposes.

(c) Statistics for Prince Edward Island included with Nova Scotia in 1936.

(d) See footnote, previous table.

DOMINION BUREAU OF STATISTICS

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1936-1940—Concluded

1	2	3	4	5	6	7
Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*)
		\$		\$	\$	\$
ALBERTA						
1936.....	594	104,118,831	10,376	11,850,463	2,357,005	20,104,417
1937.....	637	110,055,642	10,843	12,924,934	2,819,959	20,988,638
1938.....	678	120,140,472	10,612	12,811,975	2,967,269	24,931,056
1939.....	709	121,311,648	10,548	13,097,818	3,508,845	26,049,861
1940.....	724	120,234,760	10,628	14,535,789	3,832,268	29,593,293
BRITISH COLUMBIA						
1936.....	1,029	103,483,250	12,827	17,908,553	28,553,612	36,694,755
1937.....	1,135	121,739,009	14,282	21,487,277	44,123,775	51,176,437
1938.....	1,158	129,667,163	15,179	21,975,143	33,686,771	49,519,855
1939.....	1,130	119,437,535	14,587	21,698,690	34,754,310	45,419,651
1940.....	1,169	115,249,764	14,420	23,227,719	38,730,717	52,513,427
NORTHWEST TERRITORIES						
1936.....	4	274,883	28	40,812	12,140	(a) 14,415
1937.....	8	2,114,300	132	221,181	113,221	(a)—(e)
1938.....	17	4,136,077	310	584,619	407,710	(a)—(e)
1939.....	15	2,110,344	273	468,996	354,228	1,592,779
1940.....	16	3,037,930	441	880,414	623,965	1,539,206
YUKON						
1936.....	14	8,647,767	566	1,372,917	624,686	1,912,449
1937.....	10	10,793,636	691	1,502,692	1,184,231	2,685,664
1938.....	11	12,044,536	794	1,962,941	1,577,613	2,667,051
1939.....	10	10,117,207	728	1,605,671	1,598,650	3,803,985
1940.....	11	10,141,337	617	1,518,747	695,692	3,091,943
Canada						
1936.....	13,229	859,063,095	90,999	116,766,222	205,360,362	291,972,359
1937.....	15,408	957,344,974	105,414	144,292,384	289,834,949	372,796,027
1938.....	14,130	954,248,052	107,275	145,644,000	279,366,162	374,415,674
1939.....	14,239	941,775,385	107,759	152,353,208	270,110,772	393,232,044
1940.....	13,665	976,348,028	108,886	164,489,686	302,263,316	446,060,729

Plants in the provinces do not add to Canada total, owing to the fact that a plant located on the Manitoba-Saskatchewan boundary is counted but once.

*See footnote, preceding table.

(a) Value radium and uranium not included.

(b) Includes fuel and electricity used for metallurgical purposes.

(d) See footnote, previous table.

(e) Northwest Territories showed a loss \$56,931 in 1937 and \$99,092 in 1938 owing to the fact that radium and uranium refinery products are not included. These amounts should be subtracted from the total net value by provinces to give the total net value for Canada. The value of refinery products is credited to the non-ferrous smelting and refining industry of Ontario.

Table 21 (a).—Revised Monthly Production of Principal Minerals in Canada, 1940

	Asbestos		Cement	Clay Products		Coal	Copper	Feldspar	Gold	Gypsum	Lead	Lime	Natural Gas	Nickel	Petroleum	Salt	Silver	Zinc
	tons	barrels		\$	tons	tons	pounds	tons	fine ounces	tons	pounds	tons	M cu. ft.	pounds	barrels	tons	fine ounces	pounds
January.....	26,669	192,404		256,656	1,732,885	50,877,953	1,670	425,034	62,285	34,476,312	50,766	5,304,963	20,329,948	476,111	12,665	1,740,160	29,748,490	
February.....	21,340	206,048		244,209	1,490,395	50,450,199	3,168	405,982	55,013	33,643,930	46,630	4,730,094	21,707,396	644,849	12,357	1,779,185	31,002,242	
March.....	24,938	254,006		238,169	1,341,189	56,087,450	1,134	430,519	36,991	40,423,137	52,828	4,302,194	21,313,354	559,394	13,499	1,880,203	32,654,426	
April.....	30,468	420,564		394,744	1,273,015	58,200,933	457	419,282	49,590	41,178,337	56,025	3,626,598	19,333,762	624,132	21,156	1,863,196	31,121,812	
May.....	27,402	731,084		673,318	1,267,687	59,774,369	989	443,199	125,771	42,414,521	61,076	2,667,783	20,946,555	665,993	24,905	2,101,975	32,638,570	
June.....	25,741	926,793		675,551	1,159,942	54,685,519	1,461	451,964	197,185	41,629,573	59,449	2,107,452	18,817,658	646,602	22,381	3,255,795	36,280,941	
July.....	30,362	980,743		598,744	1,253,787	52,101,635	2,165	457,330	171,070	38,022,005	59,959	2,077,515	20,765,184	866,968	22,853	2,149,194	48,190,455	
August.....	32,001	907,583		681,965	1,398,145	54,003,199	2,393	466,946	179,147	39,243,277	70,385	2,023,099	21,492,542	858,155	18,555	1,885,462	41,849,422	
September.....	30,460	906,866		710,863	1,366,391	51,397,213	2,215	441,145	179,593	40,657,149	58,542	2,222,858	21,053,740	831,256	19,949	1,889,382	34,693,548	
October.....	34,731	1,096,402		790,112	1,734,009	57,401,413	2,546	468,170	175,941	40,185,698	70,035	2,983,839	18,958,024	807,100	29,086	1,701,991	35,635,925	
November.....	33,708	643,097		608,988	1,878,344	53,854,063	2,230	450,712	125,896	40,317,674	66,468	4,336,269	19,328,369	882,701	26,453	1,798,263	34,511,020	
December.....	28,985	294,038		471,228	1,671,095	56,759,495	1,027	450,862	90,316	39,658,043	64,517	4,849,461	21,511,339	727,717	16,846	1,728,946	35,702,011	
Calendar Year....	346,805	7,559,648		6,344,547	17,566,884	655,593,441	21,455	5,311,145	1,448,788	471,850,256	716,730	41,232,125	245,557,871	8,599,978	240,705	23,833,752	424,028,862	

Table 22.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1940

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage earners	Total†	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
Nova Scotia.....	550	66	14,318	14,934	1,124,184	18,161,478	19,285,662
New Brunswick.....	78	24	2,138	2,240	183,764	1,755,396	1,939,160
Quebec.....	1,705	146	19,875	21,726	3,713,255	25,312,163	29,025,418
Ontario.....	3,171	419	35,184	38,774	8,913,163	57,482,682	66,395,845
Manitoba.....	279	18	2,848	3,145	763,059	4,343,995	5,107,054
Saskatchewan.....	174	12	1,775	1,961	426,340	2,147,538	2,573,878
Alberta.....	920	125	9,583	10,628	2,218,348	12,317,441	14,535,789
British Columbia.....	1,351	166	12,903	14,420	3,398,935	19,828,784	23,227,719
Yukon.....	47	8	562	617	180,801	1,337,946	1,518,747
Northwest Territories.....	80	3	358	441	145,926	734,488	880,414
Canada.....	8,355	987	99,544	108,886	21,067,775	143,421,911	164,489,686

* The average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous years, is the sum of these individual averages.

† The data are not inclusive of all individuals or syndicates engaged exclusively in prospecting or general exploration.

Table 23.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1940

Industry	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
					\$	\$	\$
METAL MINING							
Alluvial Gold Mines.....	64	12	764	840	212,115	1,468,664	1,680,779
Auriferous Quartz Mines.....	2,510	148	28,747	31,405	6,794,255	48,410,841	55,205,096
Copper-Gold-Silver Mines.....	446	46	5,623	6,115	1,325,021	9,452,806	10,777,827
Silver-Colbat Mines.....	17	1	105	123	40,970	117,054	158,024
Silver-Lead-Zinc Mines†.....	224	20	1,341	1,585	519,705	2,532,827	3,052,532
Nickel-Copper Mines.....	298	3	6,071	6,372	884,350	11,372,513	12,256,863
Miscellaneous Metal Mines.....	65	6	374	445	113,482	514,543	628,025
Non-ferrous Smelting and Refining.....	1,356	202	11,908	13,466	3,661,048	18,105,149	21,766,197
NON-METAL MINING, INCLUDING FUELS							
Coal.....	1,198	108	25,128	26,434	2,688,619	31,354,543	34,043,162
Natural Gas.....	611	200	1,378	2,189	1,218,836	1,529,904	2,748,740
Petroleum.....	299	49	1,393	1,741	754,229	2,081,181	2,835,410
Other Non-Metallic Mining							
Asbestos.....	280	40	3,566	3,886	641,770	4,086,932	4,728,702
Feldspar and Quartz (a).....	29	4	367	400	40,645	336,609	377,254
Gypsum.....	54	3	637	694	111,422	606,244	717,666
Iron Oxides.....	4	1	41	46	7,896	30,946	38,842
Mica.....	8	.....	210	218	8,567	126,138	134,705
Salt.....	80	40	466	586	299,521	536,985	836,506
Talc and Soapstone.....	6	1	87	94	19,563	61,316	80,879
Miscellaneous.....	55	12	480	547	169,102	534,399	703,501
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	79	4	969	1,052	191,548	1,324,218	1,515,766
Clay Products.....	261	35	2,261	2,557	605,913	2,069,338	2,675,251
Lime.....	67	10	885	962	127,943	875,728	1,003,671
Sand and Gravel.....	98	5	4,140	4,243	192,696	3,551,889	3,744,585
Stone.....	246	37	2,603	2,886	438,559	2,341,144	2,779,703
Total.....	8,355	987	99,544	108,886	21,067,775	143,421,911	164,489,686

* See footnote, preceding table.

† Includes pitchblende-silver mines.

(a) Includes nepheline-syenite mines.

Table 24.—The Number of Wage-earners in the Canadian Mining Industry, 1939, who Worked the Number of Hours Specified, during One Week in Month of Normal Employment

(Does not include overtime*)

	30 hours or less	31-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-54 hours	55 hours	56-64 hours	65 hours and over	Grand total	Total wages paid in that week*
By provinces—												\$
Nova Scotia.....	146	217	218	37	13,685	49	495	8	497	245	15,597	426,464
New Brunswick.....	30	145	58	11	2,549	56	266	8	171	26	3,320	55,520
Quebec.....	621	712	475	512	16,218	2,761	2,212	325	3,549	1,305	28,690	634,035
Ontario.....	542	847	384	1,628	23,413	990	2,269	278	6,765	1,882	38,998	1,261,145
Manitoba.....	20	32	104	11	2,275	104	462	15	632	343	3,998	107,154
Saskatchewan.....	29	105	17	11	1,716	45	117	33	422	156	2,651	62,616
Alberta.....	201	708	396	92	9,724	209	716	44	509	123	12,722	412,394
British Columbia.....	111	342	208	185	10,949	155	562	68	1,939	82	14,601	460,032
Yukon.....									1,035	37	1,072	47,766
Northwest Territories.....	17	17		2	73	5	8		264	80	466	16,649
Canada.....	1,717	3,125	1,860	2,489	80,602	4,374	7,107	779	15,783	4,279	122,115	3,483,775
By Industries—												
METAL MINING												
Alluvial Gold Mines.....	3	3	1	2	128	12	20	1	1,206	57	1,433	54,605
Auriferous Quartz Mines.....	512	750	53	712	17,891	420	2,691	69	7,501	1,444	32,043	1,083,834
Copper-Gold-Silver Mines.....	51	107	11	11	4,037	124	807	45	685	190	6,068	193,233
Silver-Cobalt Mines.....		36			57		8	20	3		124	2,117
†Silver-Lead-Zinc Mines.....	1	11			1,213		14		371	17	1,627	58,560
Nickel-Copper Mines.....				281	6,018		2		9	9	6,319	228,308
Miscellaneous Metal Mines.....	33	36	7		74	7	15	3	462	55	692	19,197
Non-Ferrous Smelting and Re- fining.....	80	84	238	895	9,511	344	775	43	791	143	12,904	382,405
Non-Metal Mining, Including FUELS												
Coal.....	187	716	306	59	25,759	189	376	49	357	90	28,088	843,384
Natural gas.....	123	258	365	26	316	94	459	5	225	100	1,971	41,827
Petroleum.....	82	438	20	35	747	15	41	8	373	16	1,775	52,537
Other Non-Metal Mining—												
Asbestos.....	6	3		16	3,625	3		3	110	105	3,871	76,470
Feldspar and Quartz.....	23	31	3	13	140	40	7	53	156	84	550	10,878
Gypsum.....	83	21	38	9	58	15	86	11	380	207	908	19,403
Iron Oxides.....					32	20			10		62	720
Mica.....		23	8	9	71	75	25	18	2		231	3,109
Salt.....	38	29	35	24	210	5	28	10	77	63	519	11,558
Talc and Soapstone.....	3	1	5	11		1	8		90	26	145	2,385
Miscellaneous.....	36	23	12	21	121	23	40	8	236	207	727	16,998
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS												
Cement.....	1	104	70	20	411	52	71	7	337	133	1,206	34,670
Clay Products.....	65	87	184	152	451	513	725	110	940	158	3,385	67,621
Lime.....	10	11	76	8	261	4	204	86	308	115	1,083	22,970
Sand and Gravel.....	87	49	150	24	8,351	2,094	34	49	259	387	11,484	160,377
Stone.....	293	304	278	161	1,120	324	671	181	895	673	4,900	96,309
Total.....	1,717	3,125	1,860	2,489	80,602	4,374	7,107	779	15,783	4,279	122,115	3,483,775

† Contains data on mining of silver-pitchblende ores in the Northwest Territories.

* Includes the actual money wages paid, the value of room and board, where provided, deductions from employees for social services, such as, sickness, accident, insurance, pensions, etc., as well as any other allowance forming part of the employees' wages.

Table 25.—Employees and Salaries and Wages Paid in Canadian Mining Industry, 1930-1940

Year	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	15,484	19,284,197	1,391	1,132,306	15,397	15,190,714	24,706	34,433,915	3,021	4,372,044	1,371	1,040,790
1931.....	14,871	15,302,444	1,197	1,048,860	11,141	12,666,586	20,277	30,470,475	2,059	3,096,332	1,092	896,131
1932.....	13,706	11,302,801	1,480	1,123,080	7,694	8,198,379	16,376	24,412,126	1,730	2,106,017	924	748,782
1933.....	13,915	9,852,765	1,629	1,402,114	8,629	8,621,984	17,306	25,600,168	1,379	1,847,251	1,265	1,111,001
1934.....	13,500	13,594,114	1,722	1,276,770	10,362	10,492,169	22,033	32,619,846	1,948	2,796,454	1,461	1,257,282
1935.....	14,550	14,301,510	2,390	1,865,407	11,811	12,794,600	25,264	38,152,140	2,346	3,403,649	1,457	1,343,041
1936.....	15,368	15,980,687	1,744	1,248,431	14,225	15,774,362	31,105	46,899,805	2,932	3,752,367	1,828	1,937,825
1937.....	15,629	18,373,958	3,012	1,509,063	19,121	22,708,131	36,238	58,891,339	3,159	4,301,366	2,307	2,372,443
1938.....	15,591	15,959,095	3,042	2,074,273	20,829	24,485,254	35,791	58,926,900	2,840	4,393,270	2,287	2,470,530
1939.....	15,202	17,371,518	3,263	2,311,835	20,872	25,689,382	37,233	63,220,042	3,027	4,541,992	2,026	2,347,264
1940.....	14,934	19,285,662	2,240	1,939,160	21,726	29,025,418	38,774	66,395,845	3,145	5,107,054	1,961	2,573,878

Year	Alberta		British Columbia		Yukon		Northwest Territories		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	12,675	16,272,916	14,836	21,412,925	319	835,525	.....	.....	89,200	113,975,332
1931.....	10,579	11,357,722	11,297	16,345,887	296	784,862	.....	.....	72,809	91,969,299
1932.....	9,692	10,476,449	9,565	12,612,151	286	761,585	17	30,679	61,470	71,772,049
1933.....	9,057	9,463,382	9,845	11,455,946	233	545,692	76	131,502	63,334	70,031,805
1934.....	9,843	9,792,297	12,270	15,482,102	286	660,814	80	154,338	73,505	88,126,156
1935.....	9,706	10,862,198	12,352	16,479,606	333	809,067	47	69,341	80,256	100,080,559
1936.....	10,376	11,850,463	12,827	17,908,553	566	1,372,917	28	40,812	90,999	116,766,222
1937.....	10,843	12,924,934	14,282	21,487,277	691	1,502,692	132	221,181	105,414	144,292,384
1938.....	10,612	12,811,975	15,179	21,975,143	794	1,962,941	310	584,619	107,275	145,644,000
1939.....	10,548	13,097,818	14,587	21,698,690	728	1,605,671	273	468,996	107,759	152,353,208
1940.....	10,628	14,535,789	14,420	23,227,719	617	1,518,747	441	880,414	108,886	164,489,686

Table 26.—Wage-earners, Surface, Underground and Mill, 1940

Province	Metal Mines			Fuels			Other†		
	Surface (a)	Under- ground	Mill	Surface	Under- ground	Mill	Surface	Under- ground	Mill
Nova Scotia.....	113	203	28	2,067	10,882	.....	897	63	65
New Brunswick.....	.....	.....	.....	434	1,046	.....	601	28	29
Quebec.....	5,187	4,723	641	.....	.....	.....	6,579	581	2,164
Ontario.....	11,601	17,531	1,742	1,145	.....	.....	2,697	78	390
Manitoba.....	1,059	931	174	1	3	.....	572	15	93
Saskatchewan.....	375	230	75	257	402	.....	375	.....	61
Alberta.....	.....	.....	.....	3,394	5,477	.....	641	.....	71
British Columbia.....	4,646	3,741	1,021	734	2,049	.....	617	10	85
Yukon.....	368	63	131	.....	.....	.....	.....	.....	.....
Northwest Territories..	176	153	21	8	.....	.....	.....	.....	.....
Total 1940.....	23,525	27,575	3,833	8,040	19,859	.....	12,979	775	2,958
Total 1939.....	23,018	26,530	3,750	8,037	19,861	.....	11,406	857	5,766
Total 1938.....	23,326	24,754	3,713	8,277	20,260	.....	15,808	678	1,894
Total 1937.....	23,608	23,400	3,350	8,204	20,330	.....	11,766	688	5,582
Total 1936.....	20,431	19,223	2,700	7,676	20,086	.....	8,618	155	4,506

† Includes asbestos, salt, gypsum, stone quarries, brick plants, etc., etc.

(a) Including non-ferrous smelters and refineries.

Table 27.—Fuel and Electricity Used for All Purposes

Industry	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
METAL MINING								
Alluvial Gold.....Quantity		4		22		7	89,606	1,471
.....\$		237	10	1,880		706	48,501	820
Auriferous Quartz.....Quantity	16,329	32,501	1,977	1,515	261	237	656,846	29,023
.....\$	149,855	310,402	26,045	24,043	1,370	2,677	201,564	6,435
Copper-Gold-Silver.....Quantity	11,762		169		93,347	66	75,652	5,307
.....\$	103,915		3,761		184,511	1,166	21,968	1,573
Silver-Cobalt.....Quantity		120		161			2,596	
.....\$		1,230		2,855			2,809	
Silver-Lead-Zinc.....Quantity	33,800				241		35,061	415
.....\$	140,125				1,323		14,781	153
Nickel-Copper.....Quantity	1,292	9,677		103		32	32,949	3,229
.....\$	7,184	63,876		1,697		395	7,288	639
Miscellaneous Metals.....Quantity	19	1,177	103			14,727	43,982	1,090
.....\$	180	8,230	1,674			65,976	12,746	277
Non-Ferrous Smelting and Refining.....Quantity	616,419	200,979	52	99		348,785	208,075	10,969
.....\$	3,833,571	1,284,352	986	969		3,383,156	50,255	2,269
<i>Total.....Quantity</i>	<i>679,621</i>	<i>244,458</i>	<i>2,301</i>	<i>1,860</i>	<i>93,849</i>	<i>363,854</i>	<i>1,139,767</i>	<i>51,504</i>
<i>.....\$</i>	<i>4,233,830</i>	<i>1,668,327</i>	<i>32,476</i>	<i>31,444</i>	<i>187,204</i>	<i>3,454,076</i>	<i>357,912</i>	<i>12,166</i>
NON-METAL MINING, INCLUDING FUELS								
Coal.....Quantity	523,791				45,831		124,803	21,783
.....\$	1,607,011				48,672		30,238	3,221
Natural Gas.....Quantity	7	584	3				44,694	930
.....\$	90	4,209	75				10,865	226
Petroleum.....Quantity	3,518				24	11	129,622	38,382
.....\$	18,791				120	96	22,282	953
<i>Total.....Quantity</i>	<i>532,316</i>	<i>584</i>	<i>3</i>		<i>45,855</i>	<i>11</i>	<i>299,119</i>	<i>61,095</i>
<i>.....\$</i>	<i>1,625,892</i>	<i>4,209</i>	<i>75</i>		<i>48,792</i>	<i>96</i>	<i>63,385</i>	<i>4,400</i>
Other Non-Metal Mining								
Asbestos.....Quantity	36,865	46	18,256	4,664			107,112	3,461
.....\$	284,038	735	154,222	35,905			26,207	1,583
Feldspar, nepheline syenite and Quartz.....Quantity	1,300	4,334				5	44,475	1,427
.....\$	9,920	26,220				76	9,925	298
Gypsum.....Quantity	7,805	1,305			1,513	483	132,604	845
.....\$	47,962	8,208			6,154	5,525	27,964	166
Iron Oxides.....Quantity	49	74		8		7	400	40
.....\$	287	659		106		103	104	8
Mica.....Quantity	251						28,234	82
.....\$	2,387						6,173	21
Salt.....Quantity	15,469	37,756		5,137	6,616		25,844	57
.....\$	71,904	173,249		25,258	22,812		5,926	16
Talc and Soapstone.....Quantity	3						7,144	60
.....\$	27						1,458	11
Miscellaneous.....Quantity	22,205	2,105	19		15,611	2	108,749	3,039
.....\$	136,358	11,721	240		43,042	20	25,304	606
<i>Total.....Quantity</i>	<i>83,947</i>	<i>45,620</i>	<i>18,275</i>	<i>9,859</i>	<i>23,740</i>	<i>497</i>	<i>454,462</i>	<i>14,011</i>
<i>.....\$</i>	<i>552,883</i>	<i>220,786</i>	<i>154,462</i>	<i>61,269</i>	<i>72,008</i>	<i>5,724</i>	<i>103,061</i>	<i>2,709</i>
STRUCTURAL MATERIALS AND CLAY PRODUCTS								
Cement.....Quantity	185,325	85,835					134,033	4,238
.....\$	1,108,237	513,224					30,959	750
Clay Products.....Quantity	23,008	105,550	563	455	2,007	406	127,985	7,217
.....\$	175,126	696,862	4,299	3,052	6,098	3,926	32,023	1,587
Lime.....Quantity	81,390	60,095	6	1,862	81	16,813	86,212	1,244
.....\$	567,930	298,189	45	16,013	305	123,562	21,250	291
Sand and Gravel.....Quantity	1,070	3,657	617	1		1	480,811	9,120
.....\$	8,452	25,970	3,726	8		11	116,143	1,766
Stone.....Quantity	3,064	6,176	207		88	170	658,865	2,349
.....\$	23,463	44,578	2,193		723	1,569	150,293	477
<i>Total.....Quantity</i>	<i>298,857</i>	<i>261,363</i>	<i>1,393</i>	<i>2,318</i>	<i>2,176</i>	<i>17,390</i>	<i>1,487,906</i>	<i>24,168</i>
<i>.....\$</i>	<i>1,833,255</i>	<i>1,578,823</i>	<i>10,263</i>	<i>19,073</i>	<i>7,126</i>	<i>129,068</i>	<i>350,668</i>	<i>4,880</i>
Grand Total.....Quantity	1,594,741	552,025	21,972	14,037	165,620	381,752	3,381,251	150,778
.....\$	8,295,863	3,472,145	197,276	111,786	315,130	3,588,964	875,026	24,155

(a) On outgoing shipments only.

(b) Paid by mine operators only.

in the Mineral Industry in Canada, by Kinds and Industries, 1940

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased (e)	Total	Electricity generated for own use	Electricity generated for sale	Process supplies †	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
132,897	3,922						32,901,006	4,091,994			
41,605	42,201			8		135,968		25,860	58,342	42,628	61,742
6,995,037	109,363		16,229		868,846,323		107,433,458	443,040			
1,092,046	438,826		361	1,118	5,893,562	8,147,304		7,053	20,751,201	691,649	2,486,587
858,890	351				270,601,445		94,081,911	206,958	5,812,178	882,633	17,378,092
80,961	1,675			935	896,989	1,297,454		6,200			
2,300	75				514,800						
328	521				5,157	10,900			27,836	3,127	15,484
517,975	591				43,817,835		11,310,245	38,797			
108,552	7,062			98	196,063	468,157		12,469	799,289	1,455,311	1,657,811
317,669	50				142,572,204						
29,996	300				430,205	541,580			6,242,041		
471,024	3,374	400			10,820,482		221,560				
58,946	14,675	32			73,125	235,861			86,797	32,982	364,533
26,313,228	7,402	2,969	206		3,768,324,842		261,082,498	26,241,734	(c)		
1,391,580	40,832	3,568	164	8,516	9,510,445	19,510,663		145,895	13,515,941	(d)	
55,609,020	125,128	3,369	16,435		5,105,497,931		507,030,678	31,022,523			
2,804,014	546,092	3,600	525	10,675	17,005,546	30,347,887		197,477	47,293,625	3,108,330	21,964,249
41,350					145,038,183		52,234,433	17,171,234			
7,544					1,613,569	3,310,255		223,936	5,685,976		
3,300	4	440	148,238		17,424						
324	55	220	69,126		371	85,561			8,793		
544,281	973		7,888,349		2,368,899						
20,804	2,499		837,006	20	32,263	934,834			533,161		
588,931	977	440	8,036,587		147,424,506		52,234,433	17,171,234			
28,672	2,554	220	906,132	20	1,646,203	4,330,650		223,936	6,227,930		
57,745					129,406,027						
9,510					1,008,707	1,520,907			2,200,061		
90,142	1,184	2,694			1,499,324		692,081				
9,017	4,207	707		2	15,762	76,134			138,383		
158,588	447		34,777		6,185,143		515,505				
15,601	2,087		13,911		67,386	194,964			223,375		
1,200	3,330				288,200				435		
129	13,320				2,882	17,598					
	265					9,571	202,493			18,258	
90,197	990				2,318,990		5,589,440			539,179	
9,904			45		12,502	321,589					
5,390	60		45		1,184,970		48,000				
788	150				13,046	15,480			21,650		
2,333,736	2,479	206,302			4,635,587		1,658,894				
108,488	9,045	24,715		188	43,242	402,969			205,059		
2,736,998	7,765	208,996	34,822		145,518,241		8,706,413				
153,437	29,799	25,422	13,935	190	1,163,527	2,559,212			3,346,400		
35,116	31				126,737,622						
4,108	127				690,266	2,347,730			1,943,491		
178,720	39,266	18,760	824,878		11,055,009		285,707				
11,397	144,962	4,003	29,396	334	169,528	1,282,593			139,685		
612,920	54,822		350,597		10,398,113		1,307,252				
23,101	193,026		117,887	1,298	61,150	1,424,047			177,499		
172,070	3		65		3,614,057		3,000		46,377		
24,569	32		45		63,909	244,631					
274,811	1,953		3,000		19,715,907		1,773,530		676,056		
30,119	6,556		1,600	143	266,605	528,319					
1,273,637	96,075	18,760	1,178,540		171,520,708		3,369,489				
93,294	344,703	4,003	148,928	1,775	1,251,458	5,827,320			2,983,058		
40,208,586	229,945	231,565	9,266,384		5,569,961,386		571,341,013	48,193,757			
3,079,417	923,148	33,245	1,069,520	12,660	21,066,734	43,065,069		421,413	59,851,013	3,108,330	21,964,249

(c) In addition cost of ores, etc., treated totalled, \$174,274,655.

(d) Data not available.

†Explosives, chemicals, containers, etc.

(e) Cost includes service charges.

Table 28.—Fuel and Electricity Used for All Purposes

Province	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
Nova Scotia.....	Quantity 394,249			2		4,672	175,573	1,075
	\$ 1,349,474			40		26,370	37,666	216
New Brunswick.....	Quantity 14,934	11					33,657	107
	\$ 78,984	212					7,520	20
Quebec.....	Quantity 405,751	60,840	18,501	7,248	88	4,512	802,290	23,029
	\$ 2,855,582	481,803	157,681	60,346	723	49,118	203,252	4,703
Ontario.....	Quantity 353,326	491,008	3,143	6,663	36	291,198	1,350,440	43,529
	\$ 2,063,113	2,986,991	33,306	47,518	351	2,784,401	334,894	9,318
Manitoba.....	Quantity 63,379	21	64	47	8,525	246	141,565	3,374
	\$ 520,726	244	1,277	313	31,038	3,302	48,321	898
Saskatchewan.....	Quantity 26,718	127	150		39,568	11	163,448	3,537
	\$ 192,749	2,117	1,561		70,852	175	43,602	772
Alberta.....	Quantity 140,941				23,590	11	111,837	45,372
	\$ 381,302				25,313	96	25,786	2,651
British Columbia.....	Quantity 195,426	18	114	55	93,813	81,095	466,380	29,696
	\$ 852,777	778	3,451	1,689	186,853	724,796	120,867	4,885
Yukon.....	Quantity 4			22		7	60,348	947
	\$ 450			1,880		706	38,087	631
Northwest Territories....	Quantity 13						75,716	112
	\$ 706						15,031	61
Canada.....	Quantity 1,594,741	552,025	21,972	14,037	165,620	381,752	3,881,254	150,778
	\$ 8,295,863	3,472,145	197,276	111,786	315,130	3,588,964	875,026	24,155

(a) On outgoing shipments only.

(b) Paid by mine operators only.

Table 29.—Fuel and Electricity Used only for Metallurgical

Province	Bituminous coal		Anthracite coal		Lignite coal	Coke
	Canadian	Imported	From United States	From other countries		
	Tons	Tons	Tons	Tons	Tons	Tons
Quebec.....	Quantity 120,930	101	41			3,815
	\$ 930,457	736	791			42,074
Ontario.....	Quantity 324,057	152,659				263,273
	\$ 1,874,711	956,166				2,609,899
Manitoba.....	Quantity 37,212					
	\$ 309,375					
Saskatchewan.....	Quantity 17,511					
	\$ 145,588					
British Columbia.....	Quantity 89,504					80,288
	\$ 421,283					717,150
Canada.....	Quantity 589,214	152,760	41			347,376
	\$ 3,681,414	956,902	791			3,369,123

* All used in the non-ferrous smelting and refining industry and included in table 28.

in the Mineral Industry in Canada by Provinces, 1940

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased (e)	Total	Electricity generated for own use	Electricity generated for sale	Process Supplies	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
444,962 46,677	4,834 17,160	206,302 24,715			97,497,538 1,051,481	2,553,799	28,935,301	13,206,464 128,499	3,476,982	3,115	7,258
8,285 893	12,051 42,419		35,729 16,931	1,298	2,877,448 57,981	206,258	137,185		169,934		
9,968,604 654,990	73,242 268,767	2,869 2,573		277	2,681,709,981 8,106,116	12,845,931	268,425,475	25,473,380 142,568	14,439,922	261,304	9,872,406
20,815,085 1,409,381	91,356 336,221	22,394 5,957	494,182 181,613	6,140	1,548,892,756 7,360,816	17,560,020	24,193,722	941,034 5,180	29,301,593	226,049	1,690,299
139,753 28,231	17,173 71,608			2,264	276,454,196 479,662	1,187,884	11,544,660		2,496,503	268,553	4,354,691
2,286,828 121,870	1,062 9,082		460 46	1,066	112,640,802 146,727	590,619	16,660,220		1,154,224	2,614	1,708,852
544,630 20,823	2,844 10,533		8,736,013 870,930		40,314,864 447,318	1,784,752	11,019,605	490,409 37,406	2,047,516		
5,068,315 529,584	18,179 75,375			1,556	809,573,801 3,416,633	5,919,244	164,518,929	3,951,679 69,431	6,265,472	2,149,653	4,123,557
210,452 95,941	3,206 40,382			59		178,136	33,574,186	4,130,791 38,329	143,080	186,411	188,065
721,672 171,027	5,998 51,601					238,426	12,331,730		355,787	10,631	19,121
40,208,586 3,079,417	229,945 923,148	231,565 33,245	9,266,384 1,069,520	12,660	5,569,961,356 21,066,734	43,065,069	571,341,013	48,193,757 421,413	59,851,013	3,108,330	21,964,249

Purposes in the Mineral Industry of Canada, by Provinces, 1940*

Gasolene	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manu- factured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
	4,676 1,029	7,882,269 407,130	1,510 10,009	2,469 2,541			2,027,859,645 4,363,419	5,758,186	251,746,999
15,599 2,184		17,136,830 849,905	4,453 21,574	500 1,027	206 164		245,481,580 740,548	7,062,295	
283 170		13,165 2,396	128 895				109,990,680 81,763	396,230	
133 80		6,195 1,128	60 421				51,760,320 38,476	186,461	
81,542 24,477		882,974 101,470	1,214 7,706				538,916,143 2,020,936	3,293,022	
97,557 26,911	4,676 1,029	25,921,433 1,362,029	7,365 40,605	2,969 3,568	206 164	8,516	2,974,008,368 7,245,142	16,696,194	251,746,999

Table 30.—Electricity Purchased by

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total entire mining industry	
	K.W.H.	\$*	K.W.H.	\$*	K.W.H.	\$*
1925.....	160,192,738	1,413,861	612,062,882	3,542,342	944,819,733	6,927,280
1926.....	169,287,220	1,547,152	1,215,488,195	4,992,979	1,604,089,435	8,780,863
1927.....	221,866,174	1,742,860	1,490,457,194	5,509,534	1,799,505,643	8,025,375
1928.....	224,756,744	2,002,062	1,530,612,608	6,271,434	1,856,391,170	9,072,073
1929.....	233,219,275	1,983,959	1,662,142,083	6,934,286	2,054,411,658	10,353,034
1930 (a).....	213,116,298	1,927,268	1,752,490,909	7,535,324	2,151,082,619	10,929,340
1931 (b).....	253,436,606	2,222,870	1,874,324,568	7,309,118	2,213,264,599	10,514,814
1932.....	314,326,323	2,516,897	1,499,911,795	6,626,600	1,758,083,427	9,615,706

* Includes service charges.

(a) 1925 to 1930 for power only.

(b) 1931-1940 for all purposes.

Table 31.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Province	Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power em- ployed	Electric motors run by primary power in same plant	Boilers
Nova Scotia..... No.	58	33	63	2	156	764	920	232	96
H.P.	50,211	3,766	3,008	645	57,630	56,819	114,449	10,671	27,963
New Brunswick.... No.	18	1	40	.....	59	225	284	15	18
H.P.	1,655	60	1,175	.....	2,890	2,365	5,255	257	1,110
Quebec..... No.	42	57	186	16	301	7,061	7,362	443	129
H.P.	10,543	7,468	6,467	53,212	77,690	310,784	388,474	5,130	20,298
Ontario..... No.	149	75	463	12	699	12,235	12,934	722	250
H.P.	13,213	10,358	16,222	3,305	43,098	449,759	492,857	11,224	29,125
Manitoba..... No.	11	4	33	1	49	1,553	1,602	109	33
H.P.	1,510	525	1,000	1,900	4,935	84,025	88,960	2,453	3,798
Saskatchewan..... No.	23	29	47	2	101	690	791	176	17
H.P.	1,530	2,169	1,376	3,300	8,375	35,785	44,160	3,576	2,463
Alberta..... No.	194	12	157	.....	363	1,427	1,790	358	232
H.P.	39,335	503	5,388	.....	45,226	40,070	85,296	8,388	25,561
British Columbia.. No.	78	111	137	48	374	4,180	4,554	1,325	65
H.P.	30,604	13,445	7,302	28,115	79,466	178,436	257,902	39,077	11,519
Yukon..... No.	3	19	6	3	31	.....	31	345	2
H.P.	45	2,747	92	15,000	17,884	.....	17,884	15,297	32
N.W.T..... No.	.....	17	1	.....	18	.....	18	106	8
H.P.	.....	2,495	46	.....	2,541	.....	2,541	969	370
Canada..... No.	576	358	1,133	84	2,151	28,135	30,286	3,831	850
H.P.	148,646	43,536	42,076	105,477	339,735	1,158,043	1,497,778	97,042	122,239

Canadian Mining Industry, 1925-1940

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total entire mining industry	
	K.W.H.	£*	K.W.H.	£*	K.W.H.	£*
1933.....	317,650,168	2,661,852	1,688,075,040	7,115,894	1,908,779,501	9,966,904
1934.....	415,570,323	3,091,147	2,099,586,731	8,433,428	2,359,525,290	11,510,481
1935.....	464,146,582	3,722,163	2,320,385,917	9,415,062	2,591,470,745	12,546,298
1936.....	449,026,003	4,345,066	2,841,045,187	10,783,296	3,151,192,519	14,055,915
1937.....	629,083,378	5,031,691	3,368,047,901	12,442,423	3,744,919,549	16,135,702
1938.....	741,866,953	5,333,427	4,125,037,129	13,917,518	4,441,098,287	17,485,652
1939.....	777,832,223	5,803,160	4,449,477,330	15,060,673	4,817,050,497	19,749,417
1940.....	868,846,323	5,893,562	5,105,497,931	17,005,546	5,569,961,386	21,066,734

Reserve or Idle, in the Mineral Industry in Canada, by Provinces, 1940

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
14	3	19		36	24	60	23	15
1,748	430	1,468		3,646	455	4,131	1,754	4,772
2		6		8	14	22		3
47		68		115	261	376		115
14	14	69	2	99	631	730	38	49
626	2,461	4,610	100	7,797	22,439	30,236	766	2,539
32	24	93		149	852	1,001	38	39
2,611	3,431	5,494		11,536	39,458	50,994	993	3,325
1	1	7		9	108	117		9
900	350	499		1,749	3,712	5,461		987
8	4	2		9	57	66		7
450	1,010	45		1,508	1,322	2,830		1,074
36	1	23		60	38	98	8	35
6,109	2	1,197		7,308	1,529	8,837	975	2,472
23	24	25	19	84	592	686	78	14
18,970	1,771	405	2,923	24,069	14,816	38,885	2,367	1,536
4	2			6		6	64	1
70	202			272		272	4,110	150
	5			8		8	11	5
	424	93		517		517	659	160
129	78	250	21	478	2,316	2,794	260	177
31,531	10,081	13,882	3,023	58,517	84,022	142,539	11,624	17,130

Table 32.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
METAL MINING—									
Alluvial Gold Mines.....	No. 5 H.P. 76	32 1,472	70 1,389	10 15,415	117 18,352	1 3	118 18,355	270 14,596	4 46
Auriferous Quartz Mines.....	No. 29 H.P. 1,527	131 21,279	108 7,916	25 15,572	293 46,294	9,272 363,742	9,565 410,036	1,721 26,915	202 15,565
Copper-Gold-Silver Mines.....	No. 3 H.P. 17,020	6 1,345	2 5	6 8,900	17 27,270	2,142 84,452	2,159 111,722	239 13,404	27 6,010
Silver-Cobalt Mines.....	No. H.P. ....	..... .....	4 263	..... .....	4 263	23 635	27 898	..... .....	1 65
Silver-Lead-Zinc Mines.....	No. 1 H.P. 142	35 4,985	5 61	3 700	44 5,888	679 18,440	723 24,328	314 5,331	11 2,286
Nickel-Copper Mines.....	No. H.P. ....	..... .....	..... .....	..... .....	..... .....	848 49,429	848 49,429	..... .....	4 402
Miscellaneous Metal Mines.....	No. 1 H.P. 35	8 490	10 355	..... .....	19 880	119 4,074	138 4,954	8 50	7 370
Non-ferrous Smelting and Refining.....	No. 29 H.P. 14,619	5 575	4 285	11 51,125	49 66,604	7,810 355,370	7,859 421,974	246 3,415	35 22,736
Total.....	No. 68 H.P. 33,419	217 30,146	203 10,274	55 91,712	543 165,551	20,894 876,145	21,437 1,041,696	2,798 63,711	291 47,450
NON-METAL MINING, INCLUDING FUELS—									
Coal.....	No. 235 H.P. 79,485	5 279	164 3,166	2 12,000	406 94,980	2,317 96,296	2,723 191,226	522 24,387	241 49,221
Natural Gas.....	No. 9 H.P. 285	..... .....	219 6,399	..... .....	228 6,684	31 703	259 7,387	..... .....	25 698
Petroleum.....	No. 71 H.P. 21,972	7 475	100 4,854	..... .....	178 27,301	151 711	329 28,012	14 430	103 7,930
Total.....	No. 315 H.P. 101,742	12 754	483 14,419	2 12,000	812 128,915	2,499 97,710	3,311 226,625	536 24,817	369 57,849
Other Non-Metal Mining									
Asbestos.....	No. 6 H.P. 210	1 120	11 429	..... .....	18 759	1,013 53,194	1,031 53,953	..... .....	20 1,290
Feldspar, nepheline-syenite and Quartz.....	No. 5 H.P. 538	6 1,057	20 859	..... .....	31 2,454	61 1,047	92 3,501	104 907	10 865
Gypsum.....	No. 9 H.P. 1,260	18 1,851	49 2,566	..... .....	76 5,677	193 6,495	269 12,172	39 940	10 1,095
Iron oxides.....	No. H.P. ....	..... .....	..... .....	..... .....	..... .....	7 86	7 86	..........	..........
Mica.....	No. 4 H.P. 125	..... .....	16 500	2 145	22 770	..... .....	22 770	6 130	..........
Salt.....	No. 25 H.P. 2,828	4 735	2 24	..... .....	31 3,587	132 940	163 4,527	160 1,681	8 3,600
Talc and Soap-stone.....	No. H.P.	2 242	9 361	..... .....	11 603	31 656	42 1,259	12 120	..........
†Miscellaneous.....	No. 6 H.P. 95	10 1,084	11 476	2 150	29 1,806	124 2,642	153 4,447	44 624	7 317
Total.....	No. 55 H.P. 5,056	41 5,089	118 5,215	4 295	218 15,655	1,561 65,060	1,779 80,715	365 4,402	55 7,167

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1940

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
5	2	8	1	16		16	38	
90	96	56	3	245		245	3,848	
16	60	114	5	195	579	774	96	53
1,335	7,600	8,980	1,720	19,635	17,817	37,452	2,226	3,379
6	1	4		11	150	161	20	12
11,356	350	416		12,122	4,631	16,753	1,631	1,259
					6	6		
					265	265		
3	7		9	19	54	73	27	4
6,000	607		1,050	7,657	2,950	10,607	312	300
					89	89		
					2,304	2,304		
		3		3	1	4	2	1
		129		129	3	132	88	25
3				3	828	831	22	3
1,134				1,134	32,675	33,809	236	610
33	70	129	15	247	1,707	1,954	205	73
19,915	8,653	9,581	2,773	40,922	60,645	101,567	8,341	5,573
46		21		67	58	125	26	42
9,374		366		9,740	1,022	10,762	1,824	6,518
3		18		21		21		
75		225		300		300		45
7	1	13		21	8	29	5	11
320	2	947		1,269	53	1,322	905	987
56	1	52		109	66	175	31	54
9,769	2	1,538		11,309	1,075	12,384	2,729	7,550
	1	2		3	39	42		
	100	95		195	3,254	3,449		
								1
								35
2	1	15		18	7	25		3
80	100	874		1,054	270	1,324		200
3		1		4		4	1	3
107		50		157		157	2	64
6				6	1	7		7
190				190	1	191		1,135
	1			1	5	6		
	36			36	190	226		
1	3	2		6	17	23	2	1
35	890	87		1,012	538	1,550	20	250
12	6	20		38	69	107	3	15
412	1,126	1,106		2,644	4,253	6,897	22	1,684

Table 32.—Power Equipment in Use, and Power Equipment in ORDINARILY IN USE

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement.....No.	1	2	47		50	1,340	1,390	11	11
H.P.	7	525	2,134		2,666	71,552	74,218	763	412
Clay Products....No.	48	11	45	5	109	539	648	21	51
H.P.	4,629	480	1,202	300	6,611	13,667	20,278	207	5,377
Lime.....No.	7	5	21		33	336	369	52	13
H.P.	235	409	687		1,331	6,328	7,659	758	1,023
Sand and Gravel..No.	18	26	55	7	106	198	304		16
H.P.	966	1,830	2,289	240	5,325	6,400	11,725		1,100
Stone.....No.	64	44	161	11	280	768	1,048	48	44
H.P.	2,592	4,303	5,856	930	13,631	21,181	34,862	2,384	1,831
Total.....No.	138	88	329	23	578	3,181	3,759	132	135
H.P.	8,429	7,547	12,168	1,470	29,614	119,128	148,742	4,112	9,743
Grand total 1940...No.	576	358	1,133	84	2,151	28,135	30,286	3,831	850
H.P.	148,646	43,536	42,076	105,477	339,735	1,158,043	1,497,778	97,042	122,239
Grand total 1939...No.	635	344	1,083	84	2,146	26,598	28,744	3,593	833
H.P.	145,843	46,226	36,625	111,350	340,044	1,083,649	1,423,693	93,511	130,608

† Includes data for peat.

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1940—Conc.

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
1	1	4		6	331	337		3
50	300	222		572	12,502	13,074		140
4		11		15	44	59		12
180		274		454	2,000	2,454		1,030
		2		2	5	7		6
		40		40	253	293		367
1		5		6	19	25	10	1
50		131		181	452	633	185	150
22		27	6	55	75	130	11	13
1,155		990	250	2,395	2,842	5,237	347	636
28	1	49	6	84	474	558	21	35
1,435	300	1,657	250	3,642	18,049	21,691	532	2,323
129	78	250	21	478	2,316	2,794	260	177
31,531	10,081	13,882	3,023	88,517	84,022	142,539	11,624	17,130
126	90	206	16	438	2,377	2,815	404	153
7,063	9,986	10,978	2,267	40,294	86,132	126,426	16,198	15,007

Table 33.—Mining Accidents in 1940

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan		Alberta		British Columbia		Canada	
	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal
UNDERGROUND—																		
Falls of roof or face.....	6	902	1	123	9	122	21	363	1	18	3	85	2	31	2	471	45	2,115
Mine cars and locomotives....	5	526		101		114	4	283		19		48	5	23	2	135	16	1,249
Gas and dust explosions.....		2		1									2	36	3	6	5	45
Explosives.....		4		11	4	16	1	16			2	7	1	2	2	9	10	65
Electricity.....				8			1					3				3	1	14
Timbering.....						11						9		2	1		1	22
Mining and loading coal.....												144		16				160
Coal cutting machines.....													1	5			1	5
Miscellaneous.....	3	1,159		245	9	663	9	770	1	134		114		35	3	1,317	25	4,437
Total.....	14	2,593	1	489	22	926	36	1,432	2	171	5	410	11	150	13	1,941	104	8,112
SURFACE—																		
Haulage.....		53		18		10		10		9		46		2		36		184
Machinery.....		29		11	1	52		89	1	13			1	4		37	3	235
Miscellaneous.....		186		52	8	219	6	592	1	77		128	1	20	4	520	20	1,794
Total.....		268		81	9	281	6	691	2	99		174	2	26	4	593	23	2,213
Grand Total 1940	14	2,861	1	570	31	1,207	42	2,123	4	270	5	584	13	176	17	2,534	127	10,325
Grand Total 1939	16	2,706	1	476	18	1,692	51	2,246	4	303	3	509	17	237	17	2,606	127	10,775
Grand Total 1933	12	783		208	8	349	25	1,513			4	267	6	169	14	1,061	69	4,350
Grand Total 1928	28	2,575	2	224	24	416	85	2,515			1	34	28	193	28	1,988	196	7,945

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

Including—(a) The Alluvial Gold Mining Industry; (b) The Auriferous Quartz Mining Industry; (c) The Copper-Gold-Silver Mining Industry; (d) Miscellaneous Data on Monetary Gold and World Gold Production, Prices, Exchange, etc.

Definition of the Industry.—Gold mining in Canada is classified into three principal industries—(a) the recovery of gold from the gravels and sands of stream channels or beaches or what is defined as “The Alluvial Gold Mining Industry”; (b) the recovery of lode gold, which is named “The Auriferous Quartz Mining Industry” and in which industry the gold is usually the most important economic constituent of the ores mined and quartz the predominant gangue mineral; (c) gold is often found in various other mineral deposits, more particularly in those of copper, and for this reason the review of Canada’s “Copper-Gold-Silver Mining Industry” is included here to complete a more comprehensive survey of the Canadian Gold Mining Industry.

Gold produced from Canadian ores in 1940 reached an all-time high record of 5,311,145 fine ounces valued at \$204,479,083. This represents an increase over the preceding year of 4.25 per cent in quantity and 11.05 per cent in value. Of the total output in 1940, Ontario mines contributed 3,261,688 fine ounces; Quebec, 1,019,175 fine ounces, and British Columbia, 617,011 fine ounces. Relatively smaller quantities were recovered from auriferous deposits in Manitoba, Yukon, Saskatchewan, Northwest Territories, Nova Scotia and Alberta. Production according to type of deposit or nature of recovery included 82.71 per cent from crude gold bullion bars produced at “gold mines”; 10.0 per cent from blister or anode copper; 4.61 per cent from copper-nickel matte, ores, slags, etc., exported; 2.12 per cent from alluvial deposits, and 0.56 per cent from base bullion made chiefly from silver-lead ores.

Accurate statistics relating to gold production in most foreign countries have been increasingly difficult to obtain since the commencement of the war in 1939. From data made available, it is estimated that Canada as a world gold producer ranked at least third in 1940 in the quantity of the precious metal produced. The Union of South Africa, with the great producers of the Transvaal field, ranked a definite first, while production in the United States, exclusive of output in the Philippine Islands, was estimated at approximately 4,808,231 fine ounces or some 502,914 fine ounces less than the Canadian total. Reliable data relating to gold production in Russia are unobtainable, but a conjectural total output of 5,000,000 ounces was reported for this country in 1939.

The estimated average price per ounce of fine gold, expressed in Canadian currency, was \$38.50 in 1940 compared with \$36.14 in 1939. Practically all new bullion produced in the Dominion from Canadian ores is sold to the Dominion Government through the Royal Canadian Mint at Ottawa, or to the Dominion Assay Office at Vancouver. This gold is refined, converted into fine gold bars weighing approximately 400 ounces each, and is usually disposed of in world markets wherever the most advantageous net price can be obtained.

The following is an excerpt from an announcement made April 30th, 1940, by the Hon. J. L. Ralston, Canadian Minister of Finance at that time:

“As part of the requisitioning of foreign exchange resources, the large gold and exchange reserve of the Bank of Canada is being transferred (May 1st, 1940) to the Foreign Exchange Control Board and the minimum gold reserve requirement for the Central Bank is being discontinued. In normal times, it is essential that a central bank should maintain a substantial reserve of gold and foreign exchange, for if it does not do so, it is not well equipped to face an

emergency. It will be recalled that in his last Annual Report, the Governor of the Bank of Canada referred to the fact that during the previous three years the gold and foreign exchange holdings of the Bank had been increased in order to have additional resources readily available in case of war. The war emergency is now with us, and the institution of foreign exchange control makes it desirable to bring together, in one central fund, the gold and foreign exchange reserves of Canada. The transfer of the Bank of Canada's gold and foreign exchange holdings to the Exchange Fund, which is now being operated by the Foreign Exchange Control Board, subject to the directions of the Minister of Finance, forms part of this program.

"It will be recalled that shortly after the outbreak of war, similar action was taken by the British Government. On September 6, 1939, gold held by the Bank of England was transferred to the Exchange Equalization Account and the foreign exchange balances of British nationals, including the Bank of England, were requisitioned, and transferred to the said account.

"The Foreign Exchange Control Board will, as part of the transfer procedure, be purchasing some \$250 millions of gold and foreign exchange from the Bank of Canada, plus the foreign exchange which will be sold by other Canadian residents."

Data relating to the gold reserves of the Bank of Canada were not published for 1940.

The publication of statistics showing the gross imports and exports of gold has been temporarily suspended as from September, 1939. Statistics for periods prior to this time have been accordingly revised to exclude all gold formerly included in the total of merchandise exports.

Statistics showing the *net* exports of non-monetary gold, including changes in stocks held under earmark are compiled in the Foreign Trade Branch of the Dominion Bureau of Statistics.

Table 34.—Production of New Gold in Canada, by Provinces and Sources, 1939 and 1940
(Gold at \$20·671834 per fine ounce)

	1939		1940	
	Fine troy ounces	\$	Fine troy ounces	\$
NOVA SCOTIA—				
In gold bullion.....	29,943	618,977	22,219	459,307
Estimated exchange equalization on gold produced.....		463,193		396,125
Total Value—Canadian Funds.....		1,082,170		855,432
QUEBEC—				
In anode copper, in ores shipped and in gold bullion.....	953,377	19,708,051	1,019,175	21,068,216
Estimated exchange equalization on gold produced.....		14,747,947		18,170,022
Total Value—Canadian Funds.....		34,455,998		39,238,238
ONTARIO—				
† Porcupine Area—In gold bullion.....	1,312,702	27,135,958	1,425,711	29,472,061
† Kirkland Lake—In gold bullion (a).....	941,371	19,459,865	1,024,105	21,170,129
† Other gold mines—In gold bullion.....	754,903	15,605,230	721,007	14,904,537
Copper-Nickel and other ores.....	77,100	1,593,798	90,865	1,878,346
Total.....	3,086,076	63,794,851	3,261,688	67,425,073
Estimated exchange equalization on gold produced.....		47,739,021		58,149,915
Total Value—Canadian Funds.....		111,533,872		125,574,988
MANITOBA—				
In gold bullion, ores shipped and in blister copper.....	180,875	3,739,018	152,295	3,148,217
Estimated exchange equalization on gold produced.....		2,797,985		2,715,140
Total Value—Canadian Funds.....		6,537,003		5,863,357
SASKATCHEWAN—				
In ores shipped to Canadian smelters, crude placer gold and gold bullion.....	77,120	1,594,212	102,925	2,127,649
Estimated exchange equalization on gold produced.....		1,192,982		1,834,964
Total Value—Canadian Funds.....		2,787,194		3,962,613
ALBERTA—				
In alluvial gold.....	359	7,421	215	4,444
Estimated exchange equalization on gold produced.....		5,554		3,893
Total Value—Canadian funds.....		12,975		8,277
BRITISH COLUMBIA—				
In alluvial gold.....	39,797	822,677	32,128	664,145
In gold bullion.....	351,451	7,265,137	348,239	7,198,739
In base bullion and in slag and ores exported.....	235,722	4,872,806	236,644	4,891,865
Total.....	626,970	12,960,620	617,011	12,754,749
Estimated exchange equalization on gold produced.....		9,698,703		11,000,175
Total Value—Canadian Funds.....		22,659,323		23,754,924
YUKON—				
In alluvial gold.....	85,572	1,768,930	79,905	1,651,753
In ores shipped.....	(b) 2,173	44,920	553	11,431
Total.....	87,745	1,813,850	80,458	1,663,214
Estimated exchange equalization on gold produced.....		1,357,342		1,434,419
Total Value—Canadian Funds.....		3,171,192		3,097,633
NORTHWEST TERRITORIES—				
In ores shipped.....	650	13,436	280	5,788
In gold bullion produced.....	51,264	1,059,721	54,879	1,134,450
Total.....	51,914	1,073,157	55,159	1,140,238
Estimated exchange equalization on gold produced.....		803,067		983,383
Total Value—Canadian Funds.....		1,876,224		2,123,621
Total for Canada	5,094,379	105,310,157	5,311,145	109,791,107
Total estimated exchange equalization on gold produced.....		78,805,794		94,687,976
Grand total value, including exchange		184,115,951		204,479,083

NOTE.—In 1940 the estimated average price of a troy ounce of fine gold in Canadian funds was \$38.50; in 1939 the corresponding price was \$36.14.

† Includes relatively small amounts of gold contained in slags, and ore shipped.

(a) Includes production in Larder Lake area.

(b) Includes a small quantity recovered as bullion.

Table 35.—Production of Gold in Canada, by Principal Mines, 1940

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
NOVA SCOTIA						
Consolidated Mining & Smelting Co. of Canada, Ltd.	12,984	2,578	12,984	6,465	40	(d) (a)
Guysborough Mines, Ltd.	38,696	6,524	32,172	7,344	100	(a) (c)
Killag Gold Mines Ltd.	565		565	268	20	(a)
Queens Mines Ltd.	2,185		2,185	885	14	(a)
Rehabilitation Project (15 mile stream).	5,596	1,502	4,094	210	25	(a) (e)
Seal Harbor Gold Mines Ltd.	88,602		88,602	4,173	200	(a) (c)
Other mines.	(b)	(b)	(b)	2,874	(b)	
Total—Nova Scotia.				(f) 22,218		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not available.
 (c) Cyanidation.
 (d) In addition 44.27 tons concentrates stock piled assaying 1.985 ounces per ton.
 (e) In addition 42 tons concentrates stock piled assaying 100 ounces per ton.
 (f) Receipts at Royal Canadian Mint, Ottawa.

QUEBEC						
Amm Gold Mines (Quebec) Ltd.	32,662		33,521	4,182	150	(a) (c) (d)
Arntfield Gold Mines Ltd.	84,077		84,425	7,168	350	(c)
Beattie Gold Mines (Quebec) Ltd.	629,920		629,920	71,464	1,500	(c)
Belletierre Quebec Mines Ltd.	92,488	4,208	88,281	26,504	330	(c)
Canadian Malartic Gold Mines Ltd.	275,693		275,693	29,767	800	(c)
Central Cadillac Mines Ltd.	44,652		59,400	8,952	200	(c)
Cournor Mining Co. Ltd.	96,477	22,637	74,209	16,164	24	(c)
East Malartic Mines Ltd.	541,447		541,447	88,746	1,800	(c)
Franceur Gold Mines Ltd.	66,624		66,264	12,071	250	(c)
Lamaque Mining Co. Ltd.	444,721		444,721	127,039	1,000	(c)
Lapa Cadillac Gold Mines Ltd.	96,590		96,295	9,568	300	(a) (c)
Malartic Gold Fields Ltd.	158,231	19,077	150,203	35,080	300	(c)
McWatters Gold Mines Ltd.	44,950	1,716	43,234	10,603	150	(a) (c)
Moschla Gold Mines Ltd.	2,851	646	2,291	2,174		(e)
O'Brien Gold Mines Ltd.	67,654		67,694	27,789	165	(a) (c) (f)
Pandora Cadillac Gold Mines Ltd.	10,324		30,079	4,051	150	(a) (c)
Perron Gold Mines, Ltd.	210,997	69,971	140,971	49,256	360	(c)
Powell Rouyn Gold Mines Ltd.	231,316		48,585	25,134	450	(c) (e)
Senator-Rouyn Ltd.	21,161		20,719	4,676		(g)
Sigma Mine (Quebec) Ltd.	279,710		279,710	59,058	350	(c)
Sisacoe Gold Mines Ltd.	232,974	39,041	194,280	46,159	600	(a) (c)
Sladen-Malartic Mines Ltd.	236,808		236,816	22,290	700	(c)
Stadacona Rouyn Mines, Ltd.	143,612		143,612	17,735	500	(c)
Sullivan Consolidated Mines Ltd.	129,940	6,150	123,790	32,310	335	(a) (c)
Wood Cadillac Mines Ltd.	85,086	8,209	76,745	13,187	225	(c)
Other gold mines.				848		
Copper-gold-silver ores.				267,200		
Total—Quebec.				1,019,175		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not available.
 (c) Cyanidation.
 (d) Operated from July 16 by Pandora Cadillac Gold Mines Ltd.
 (e) Crude ore shipped to smelter.
 (f) In addition, arsenical concentrates shipped for testing.
 (g) Milled at Arntfield mill.

ONTARIO						
Porcupine District—						
Aunor Gold Mines Ltd.	127,111		127,111	35,640	300	(c)
Broulain Porcupine Mines Ltd.	126,950	16,313	110,637	30,893	350	(c)
Buffalo Ankerite Gold Mines Ltd.	378,833	9,496	378,337	65,104	1,200	(c)
Coniaurum Mines Ltd.	185,455		185,455	48,465	600	(c)
Delnite Mines Ltd.	127,633		172,741	22,150	400	(c)
De Santis Porcupine Mines Ltd.	59,517	2,950	56,444	11,248	100	(c)
Devon Gold Mines Ltd.	1,261	200	2,333	42	50	(c) (d)
Dome Mines Ltd.	621,600		621,600	205,584	1,500	(a) (c)
Paymaster Porcupine Gold Mines Ltd.	55,006	4,340	50,666	9,883	250	(a) (c)
Hallnor Mines Ltd.	140,690		140,529	68,764	400	(c)
Hollinger Consolidated Gold Mines Ltd. (Ross)	94,697		94,522	21,381	225	(c)
Hollinger Consolidated Gold Mines Ltd. (Timmins)	1,779,185		1,780,377	436,712	6,000	(c)
McIntyre Porcupine Mines Ltd.	885,930		885,930	247,772	2,500	(c)
Moneta Porcupine Mines Ltd.	64,439		64,439	29,614	175	(c)
Naybob Gold Mines Ltd.	53,802		53,524	14,541	150	(c)
Nakhodas Mining Co.	3,968		3,968	652		(e)
Pamour Porcupine Mines Ltd.	575,728		575,728	70,818	1,500	(c)
Paymaster Consolidated Mines Ltd.	214,673	3,998	207,168	45,101	550	(c)
Porcupine Lake Gold Mining Co. Ltd.	5,192	260	4,932	470	25	(a)
Preston East Dome Mines, Ltd.	177,259	1,559	175,773	60,753	500	(a) (c)

Table 35.—Production of Gold in Canada, by Principal Mines, 1940—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
ONTARIO—Concluded						
Kirkland Lake District—						
Bidgood Kirkland Gold Mines Ltd.....	50,445		50,437	10,467	125	(c)
Golden Gate Mining Co. Ltd.....	25,481	458	25,481	6,794	125	(a) (c)
Kirkland Lake Gold Mining Co. Ltd.....	137,986		137,986	53,229	400	(c)
Lake Shore Mines Ltd.....	647,426		647,426	283,349	2,300	(c) (f)
Macassa Mines Ltd.....	150,491		150,674	69,486	400	(c)
Morris Kirkland Gold Mines Ltd.....	38,238		39,579	4,196	100	(c)
Sylvanite Gold Mines Ltd.....	212,206		212,519	68,930	600	(c)
Teck-Hughes Gold Mines Ltd.....	317,560		317,560	92,764	1,000	(c)
Toburn Gold Mines Ltd.....	68,106	8,582	59,524	33,619	150	(c)
Upper Canada Mines Ltd.....	66,656		66,656	27,915	225	(c)
Wright-Hargreaves Mines Ltd.....	442,920		442,920	225,235	1,200	(c)
Larder Lake District—						
Chesterville Larder Lake Gold Mines Ltd.....	224,228		220,816	33,305	700	(c)
Kerr-Addiscn Gold Mines Ltd.....	445,864		445,864	92,021	1,000	(a) (c)
Omega Gold Mines Ltd.....	172,595		172,595	22,780	500	(c)
Matachewan District—						
Hellinger Consolidated Gold Mines, Ltd (Young-Davidson).....	368,292		368,247	39,014	1,000	(c)
Matachewan Consolidated Mines Ltd.....	182,033		182,033	21,487	500	(c)
Tyrant Mines Ltd.....	80,631	1,306	79,875	9,996	200	(c)
Sudbury District—						
Consolidated Mining & Smelting Co. of Canada, Ltd., (Golden Rose).....	38,810		38,575	11,488	100	(c)
Algoma District—						
Cline Lake Gold Mines Ltd.....	82,431		81,981	15,429	240	(c)
Regener Metals.....	1,700	174	1,593	682	10	(a) (g)
Thunder Bay District—						
Bankfield Cons. Mines Ltd.....	43,250		42,499	11,125	130	(a) (c)
Hard Rock Gold Mines Ltd.....	167,439	47,734	119,255	31,108	300	(c)
Jellicoe Mines Ltd (h).....	4,871		10,116	3,614		(b)
Leitch Gold Mines Ltd.....	38,159	7,016	31,118	22,698	75	(a) (c)
Little Long Lac Gold Mines Ltd.....	138,983	25,918	113,065	45,724	300	(a) (c)
McLeod-Cockshutt Gold Mines Ltd.....	308,113	69,486	238,780	54,771	650	(c)
Magnet Cons. Mines Ltd.....	47,243	5,758	41,485	28,671	175	(a) (c)
Northern Empire Mines Co., Ltd.....	67,396	5,320	61,691	17,441	180	(c)
St. Anthony Gold Mines Ltd.....	75,773	5,143	59,039	10,972	125	(c)
Sand River Gold Mining Co. Ltd.....	44,562	9,836	34,726	10,460	75	(c)
Sturgeon River Gold Mines Ltd.....	45,259	17,469	27,790	13,306	75	(a) (c)
Tombill Gold Mines Ltd.....	45,228		45,228	16,756	125	(a) (c)
Kenora and Rainy River Areas—						
Kenora Mining & Milling Co. Ltd.....			476	143	25	(a) (i)
Kenricia Gold Mines Ltd.....	6,696	13	6,676	1,003	100	(c) (j)
Straw Lake Beach Gold Mines Ltd.....	5,497	710	5,133	1,305	60	(a)
Upper Seine Gold Mines Ltd.....	1,578	278	1,073	169	75	(a) (k)
Wendigo Gold Mines Ltd.....	46,330	9,574	36,756	12,337	80	(a) (l)
Patricia District—						
Berens River Mines Ltd.....	82,346		82,346	24,663	225	(m)
Central Patricia Gold Mines Ltd.....	124,019	5,845	118,803	49,011	200	(c)
Cochonour Willans Gold Mines Ltd.....	53,935		52,921	21,219	200	(a) (c) (n)
Gold Eagle Gold Mines Ltd.....	59,181	13,065	46,116	10,870	125	(c)
Hasaga Gold Mines Ltd.....	101,192	13,115	88,077	16,495	275	(c)
Howey Gold Mines Ltd.....	551,584	97,401	454,183	25,077	1,250	(c)
Jason Mines Ltd.....	24,974	1,010	23,964	10,242	125	(c)
J. M. Consolidated Gold Mines Ltd.....	4,781	187	4,594	1,310	100	(c) (o)
Madsen Red Lake Gold Mines Ltd.....	139,370	180	141,625	29,282	400	(a) (c)
McKenzie Red Lake Gold Mines Ltd.....	93,913	17,341	76,572	26,237	200	(c)
McMarnac Red Lake Gold Mines Ltd.....	4,561		4,561	1,748		(b)
Pickle Crow Gold Mines Ltd.....	170,253	28,251	141,992	74,704	400	(a) (c)
Sachigo River Exploration Co. Ltd.....	22,094	9,021	13,030	12,511	25	(a) (c)
Uchi Gold Mines Ltd.....	251,199	23,380	227,294	33,716	750	(a) (c)
Eastern Ontario—						
Consolidated Mining & Smelting Co. of Canada, Ltd. (Cordova).....	24,455		26,526	3,108	125	(c) (q)
Other gold mines.....				924		
Nickel-copper ores.....				90,865		
Total—Ontario.....				3,261,688		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not recorded.
 (c) Cyanidation.
 (d) Testing.
 (e) Milled at Faymar mill.
 (f) In addition 143,168 tons of tailings retreated.
 (g) Includes 11 tons ore shipped to smelter.
 (h) Milled at Magnet and Bankfield mines.
 (i) Customs milled only.
 (j) Closed down May 31.

- (k) In addition 30 tons concentrates stock piled, averaging 1 ounce gold per ton.
 (l) Copper-gold concentrates exported.
 (m) Gold content of concentrates exported; in addition, contains relatively large quantities of silver and lead.
 (n) Also 36,794 tons tailings retreated and in addition 229 tons concentrates stock piled assaying 3.70 ounces gold per ton.
 (o) Closed down March 31.
 (p) In addition some concentrates were stock piled.
 (q) Closed down July 30.

Table 35.—Production of Gold in Canada, by Principal Mines, 1940—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
MANITOBA						
Beresford Lake Mines Ltd.	4,520		4,520	619	40	(a) (d)
God's Lake Gold Mines Ltd.	71,768		71,768	20,711	200	(a) (c)
Gunnar Gold Mines Ltd.	53,429	1,437	51,992	17,303	145	(c)
San Antonio Gold Mines Ltd.	122,380		122,365	36,745	300	(a) (c)
Other gold mines.				1,102		(b)
Copper-gold-silver ores.				75,815		
Total—Manitoba.				152,295		

FOOTNOTES—

(a) Amalgamation.
(b) Data not available.

(c) Cyanidation.

(d) Property closed down September 30th.

SASKATCHEWAN						
Consolidated Mining & Smelting Co. of Canada Limited (Box)	451,562		451,562	20,024	1,200	(c)
Other lode gold mines.	(b)	(b)	(b)	406	(b)	(b)
Alluvial deposits.	(b)	(b)	(b)	69		
Copper-gold-silver ores.				82,426		
Total—Saskatchewan.				102,925		

FOOTNOTES—

(b) Data not recorded.

(c) Cyanidation.

ALBERTA						
Placer gold.	(x)	(x)	(x)	215		

(x) No record.

BRITISH COLUMBIA						
Armandy Mine.	518		518	127		(d)
Alpine Gold Ltd.	(b)	100	4,400	1,860	50	(d)
Bayonne Cons. Mines Ltd.	14,600		13,083	6,720	50	(c)
Bralorne Mines Ltd.	(b)		191,412	101,282	500	(a) (d)
Buena Vista Mining Co. Ltd (f)						
Cariboo Gold Quartz Mining Co. Ltd.	111,826		111,826	43,878	300	(c)
Consolidated Nicola Goldfields Ltd.	(b)	539	4,759	437	(b)	(d)
Gold Belt Mining Co. Ltd.	62,366		62,366	16,948	150	(c)
Grasshopper Mine Ltd.	1,361		1,361	924		(d)
Hedley Mascot Gold Mines Ltd.	63,280		62,812	22,819	175	(d)
Island Mountain Mines Co. Ltd.	49,229		49,229	20,961	110	(c)
Kelowna Exploration Co. Ltd.	82,338		82,660	(b)	275	(c) (d)
Kootenay Belle Gold Mines Ltd.	38,837		38,837	12,743	150	(c)
Livingstone Mining Co.	(b)	2,300	780	482	30	(d)
McArthur, W. E. (Brooklyn-Stemwinder)	2,000		1,979	619	50	(d)
McArthur, W. E. (Number 7)	773		722	185		(d)
Mt. Zeballos Gold Mines Ltd.	32,896	9,367	23,529	14,716	60	(a) (d)
Oscarson, R. (Arlington)	819		819	1,150		(d)
Osoyoos Mines of Canada Ltd.	9,207		9,207	810	150	(c) (d)
Pioneer Gold Mines of B.C. Ltd.	88,942	11,445	77,585	42,923	300	(a) (c)
Polaris-Taku Mining Co. Ltd.	80,320		80,364	22,954	150	(d) (e)
Privateer Mine Ltd.	49,248	19,240	30,008	29,594	90	(a) (c)
Relief Arlington Mines Ltd.	55,495	23,522	31,333	10,603	75	(c)
Reno Gold Mines Ltd., Sheep Creek	35,730		35,978	11,828	120	(a) (c) (d)
Reno Gold Mines Ltd., Zeballos	19,811	5,589	14,222	6,610	45	(a) (d)
Sheep Creek Gold Mines Ltd.	55,077		55,077	26,229	150	(c)
Silbak Premier Mines Ltd.	171,504		171,504	37,168	500	(d)
Spud Valley Gold Mines Ltd.	56,184	27,758	28,426	18,099	75	(a) (d)
Union Mine (W. E. McArthur)	4,248		4,144	1,082		(d)
United Prospectors Ltd. (Thistle)			2,780	1,377		(d)
Venango Gold Mines Ltd.	127		127	48		(d)
Venus Juno Mine.	(b)	(b)	183	191		(d)
White Star Mine Ltd.	508		508	2,345		(d)
Windpass Gold Mining Co. Ltd.	500	(b)	(b)	298	(b)	(d)
Winslow Syndicate	(b)		582	185	30	(a) (d)
Wukelick, J. P. (Grandora)	44		44	22		(d)
Ymir Yankee Girl Gold Mines Ltd.	53,471		53,526	10,205	100	(c) (d)
Placer gold.		(b)	(1)	32,128		
Copper-gold ores exported.				54,731		
Silver-lead and other gold mines.				61,730		
Total—British Columbia.				617,011		

FOOTNOTES—

(1) Partly estimated—cubic yards.

(a) Amalgamation.

(b) Not recorded.

(c) Cyanidation.

(d) Ore or concentrates shipped to smelter.

(e) 6,689 tons concentrates produced and 6,659 tons shipped.

(f) Not published.

Table 35.—Production of Gold in Canada, by Principal Mines, 1940—Concluded

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
YUKON						
Placers.....	(*)	(*)	(1)	79,905		
La Forma (quartz).....	(*)	(*)	(*)	292	(*)	(b)
Silver-lead ores.....				261		
Total—Yukon.....				80,458		

FOOTNOTES—

(*) No record.

(1) Cubic yards, partly estimated.

(b) In concentrates exported.

NORTHWEST TERRITORIES						
Consolidated Mining and Smelting Co. of Canada, Limited (Con).....	51,831		50,750	(*)	175	(a) (c)
Consolidated Mining and Smelting Co. of Canada, Limited—Rycon Mine.....	7,504		7,856	(*)		(d)
Negus Mines Ltd.....	26,474	4,822	21,580	(*)	50	(a) (c)
Other Gold Mines and Placers.....	(*)	(*)	(*)	289	(b)	
Silver ores.....						
Total—Northwest Territories.....				55,159		

FOOTNOTES—

(*) Not recorded or available for publication.

(a) Amalgamation.

(b) In ores smelted and refined.

(c) Cyanidation.

(d) Treated in Con. mill.

Grand Total—Canada.....				5,311,145		
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Table 36.—Source of Canadian Gold Production, 1932-1940

Year	In alluvial gold	In crude gold bullion produced at mine (a)	In base bullion produced at lead smelters	In blister copper produced (†)	In ores, matte, slags, etc., exported	Total gold produced
	%	%	%	%	%	Fine oz.
1932.....	1.8	79.3	1.0	15.1	2.8	3,044,387
1933.....	2.0	79.8	0.7	14.2	3.3	2,949,309
1934.....	2.0	78.7	1.1	13.4	4.8	2,972,074
1935.....	1.8	78.3	2.2	13.2	3.9	3,284,890
1936.....	2.2	77.4	1.6	13.8	5.0	3,748,028
1937.....	2.2	80.2	0.9	11.7	5.0	4,096,213
1938.....	2.5	80.8	0.9	11.2	4.5	4,725,117
1939.....	2.5	82.1	0.6	10.4	4.4	5,094,379
1940.....	2.1	82.7	0.6	10.0	4.6	5,311,145

(a) Includes a relatively small quantity of gold contained in interprovincial shipments of gold ores, slags, etc. to Canadian melters.

(†) Some blister copper is refined in the United States; also contains a relatively small quantity of gold recovered from auriferous quartz ores.

Table 37.—Production of Gold in Canada, 1929-1940

Year	Fine ounces	Value*	Value in Canadian funds	Year	Fine ounces	Value*	Value in Canadian funds
		\$				\$	\$
1929.....	1,928,308	39,861,663		1935.....	3,284,890	67,904,700	115,595,279
1930.....	2,102,068	43,453,601		1936.....	3,748,028	77,478,612	131,293,421
1931.....	2,693,892	55,687,688	58,093,396	1937.....	4,096,213	84,676,235	143,326,493
1932.....	3,044,387	62,933,063	71,479,373	1938.....	4,725,117	97,676,834	166,205,990
1933.....	2,949,309	60,967,626	84,350,237	1939.....	5,094,379	105,310,157	184,115,951
1934.....	2,972,074	61,438,220	102,536,553	1940.....	5,311,145	109,791,107	204,479,083

NOTE.—For years 1858 to 1928, see previous reports.

*Calculated from the value \$1=0.048375 ounces.

Table 38.—Estimated Average Monthly Value of an Ounce of Fine Gold, Expressed in Canadian Funds, 1931 and 1938-1940

Month	1931	1938	1939†
	\$	\$	\$
January.....	20.71	34.99	35.30
February.....	20.67	35.00	35.19
March.....	20.67	35.05	35.13
April.....	20.68	35.15	35.15
May.....	20.68	35.22	35.13
June.....	20.73	35.36	35.07
July.....	20.74	35.24	35.06
August.....	20.73	35.12	35.01
September.....	21.55	35.12	37.21
October.....	23.22	35.32	38.43
November.....	23.22	35.25	38.50
December.....	25.01	35.28	38.50
Yearly average.....	21.55	35.17	36.14

NOTE.—At December 29th, 1940, the price paid by the United States Treasury for gold purchased by the Mint continued at \$35 per troy ounce of fine gold, less $\frac{1}{4}$ of 1 per cent. Actual payment by the United States Treasury for gold in imported and domestic ore or concentrate was at 99.75 per cent of the price quoted by the Treasury, which, at the close of 1940 was equal to \$34.9125 per ounce.

For data 1932-1937, see Annual Report for 1937.

† The price of gold in Canadian funds remained constant at \$38.50 during the entire year of 1940.

Table 39.—Precious Metals Consumed by the Jewellery and Silverware Industry in Canada, 1939 and 1940

Materials	Cost at works	
	1939	1940
	\$	\$
Precious metals—		
Fine gold.....	1,187,238	1,595,699
Gold alloys.....	94,683	230,108
Fine silver.....	644,750	660,650
Silver alloys.....	400,947	765,067
Platinum.....	160,688	148,748
Old gold, jewellers' findings, waste and scrap for refining.....	1,482,950	1,069,156
Gold-filled wire and stock.....	141,965	213,534

THE ALLUVIAL GOLD MINING INDUSTRY IN CANADA

In 1940, and for many years past, the greater part of the Canadian production of alluvial gold came from the Yukon Territory and British Columbia; relatively small quantities are also obtained in Alberta, Saskatchewan and Quebec.

It was estimated that 139,306 ounces of crude gold were recovered from Canadian alluvial deposits in 1940. Of this production, 87 ounces came from Saskatchewan, 271 ounces from Alberta, 39,067 ounces from British Columbia and 99,881 ounces from Yukon. In addition to crude gold recovered, there were 24 ounces of platinum obtained in 1940 from alluvial deposits in British Columbia.

Quebec.—During 1940 the Appalachian Mining Syndicate completed 120 feet of trenching on a property located near Stratford Centre; the trenching was reported as 12 feet deep and 10 feet wide and the work was conducted in the months of June and July. Embergold Mines Ltd. was active from January 1 to June 30; this Company is developing properties in Ditton and Emberton Townships, Compton County, and reported both surface and underground operations on Lat. 14, Range 10, Ditton Township. In Compton Township a portable placer testing machine was purchased by Moe River Gold Mines Ltd. and numerous test pits and trenches were dug and land cleared by the Company. On Lat. 11, Range 5, Westbury Township, Compton County, trenching was carried on by W. A. Davis and approximately 5 ounces of gold were recovered.

Ontario.—Placer mining operations in Ontario in 1940 were restricted to the sampling of deposits by the Onwatin Placing Mining Syndicate Ltd. Ground explored by this Syndicate is located in Beulah, Hutton, Parkin and Norman Townships in the Capreol District. No commercial production was reported.

Saskatchewan and Alberta.—Placer gold has been mined along the North Saskatchewan River at various points between Rocky Mountain House, Alberta, and Prince Albert, Saskatchewan, from about 1860. Most activity has, however, been confined to the Alberta region, particularly in the vicinity of Edmonton.

The returns of gold from the river for a period of thirty-two years, from 1887 to 1918, are given by the Department of Mines as 15,036 fine ounces valued at \$310,814. These figures were compiled by the Department from reports of local bank managers as a basis. In 1887 the first dredge was built on the river and from that time dredges have worked with varying success, though most of the gold has been obtained by miners working with shovel and grizzly collecting the gold on blankets, after which the blankets are washed and the gold separated from the tailings by means of mercury.

The gold is irregularly distributed in the gravels of the river and under bench gravels and is recovered when conditions are convenient to work such bars which move from point to point according to the vagaries of the stream. No individual reports are received from prospectors and production as credited to placer mining is obtained from Government mint statements.

British Columbia.—It has been found impractical to obtain complete reports for each individual placer gold mining operation in British Columbia inasmuch as a considerable quantity of the crude placer gold is recovered annually by prospectors of no fixed abode who, in many instances, market their recoveries through local merchants and banks.

In 1940 official returns were made to the Dominion Bureau of Statistics by approximately 114 operators who reported 351 employees and the distribution of \$557,685 in salaries and wages. Consumption of fuel and process supplies amounted to \$82,303. The value of crude gold production was \$1,191,543 compared with \$1,454,573 in 1939. The quantity of sands and gravels treated during the year under review was estimated at 7,936,685 cubic yards; equipment employed in mining included hydraulic jets (monitors-giants), gasoline shovels, drag lines, steam shovels, tractors and land dredges. Material worked included bench gravels, river gravels, glacial deposits, tertiary channels and tailings. Operations were conducted both at the surface and underground.

Yukon.—The following is from the Annual Report of G. A. Jeckell, Controller of Yukon Territory, for the fiscal year ending March 31st, 1941:

"The amount of placer gold mined during the year in the Territory on which royalty export tax was paid was 98,138.61 ounces, produced as follows: Dawson District, 95,293.07 ounces; Mayo District, 1,938.5 ounces; Whitehorse District, 907.04 ounces. The royalty collected was \$36,802.34. The gold production was 9,939.28 ounces less than for the previous year.

"In the Dawson District, one hundred and seven new placer location grants, forty-five relocation grants and two thousand three hundred and twenty-five renewal grants were issued, representing two thousand four hundred and seventy-seven placer claims in good standing. Three dredging leases were renewed, covering twenty-three miles and fees for renewal of four hydraulic leases were paid.

"In the Mayo District fourteen new placer location grants, seven relocation grants, and ninety-four renewal grants were issued, making one hundred and fifteen placer claims in good standing. Applications were received in the mining recorder's office for twenty-one placer prospecting leases covering forty-two miles of ground.

"In the Whitehorse District, fourteen new placer location grants and twenty-six renewal grants were issued, making forty claims in good standing. Applications were received in the Recorder's Office for ten prospecting leases covering eighteen miles of ground.

"The total number of placer claims in good standing for the whole Territory was two thousand six hundred and thirty-two.

"The hydro-electric plant of the Yukon Consolidated Gold Corporation Limited, on the North Fork of the Klondike River, was operated for the entire year and generated a total of 36,991,700 kilowatt hours, an increase of 10% over the previous year. Approximately 85% of the output was used by the Company in connection with placer mining operations and the balance sold to the Dawson City Utility Companies. During the season the power ditches of the Com-

pany aggregated 22 miles in length and were maintained in first class condition. Hydraulic muck stripping operations were conducted during the summer season at eight large plants; the yardage removed was about 14% higher than during the preceding years; a total of \$229,530 was expended on stripping operations, an average of 5.34 cents per cubic yard. Cold water thawing operations were continued at six plants formerly operated and a new plant on Middle Hunker was operated for the entire season. Nine dredges were operated by the Company for the entire season and a tenth dredge, No. 4, was operated until July 6th when it was shut down and dismantled after completion of mining in the Arlington Area at the mouth of Hunker Creek. Due to a combination of favourable conditions and an early breakup, the dredges were able to start earlier than usual in the spring, and the last one started on April 29th, which is a record for the district. Dredging closed down on dates from November 2nd to January 1st. Prospecting drilling was resumed by the Company during the season, two drills being operated continually from early in April until the latter part of October.

"The Holbrook Dredging Company, in Receivership, operated a dredge on the Upper Sixtymile River, commencing on May 15th and closing down on November 3rd, 1940. The dredge is diesel operated and equipped with fifty-two four foot buckets. Operations were continued in 1940 on Miller Creek by Stewart and Campbell, and a few individual miners operated on Glacier Creek. On Clear Creek, in the Stewart River, area, extensive operations were carried on by Canadian Placers Ltd.; new equipment included 2-Td-18 International Tractors: 1-10B Bucyrus Erie Dragshovel; and 1-37-B Bucyrus Erie Dragline; ten camp buildings were erected and thirty-seven and one-half miles of road were constructed from the river landing at McQuesten Landing field to the mining camp on the left fork of Clear Creek; with Government aid the actual mining operations were started on September 13th and continued to October 13th, with very satisfactory results.

"In the Mayo District more extensive placer operations were carried on than formerly, particularly on Haggart Creek, Dublin Gulch and Hight Creek. Individual placer mining was generally on the increase throughout the Territory, and there was an increase in new locations and areas acquired under prospecting lease."

Table 40.—Summary Statistics of Alluvial Gold Mining in Canada, 1939 and 1940

	1939			1940		
	(d) British Columbia	Yukon (e)	(f) Quebec Saskatchewan and Alberta	(d) British Columbia	Yukon (e)	(f) Quebec Saskatchewan and Alberta
Number of firms and individual operators(f).	89	6	(g) 2	114	7	(g) 4
Capital employed.....\$	2,098,507	7,746,017	(c)	1,562,172	8,359,707	12,015
Number of employees.....	361	465	(g) 4	351	472	(g) 17
Salaries and wages paid.....\$	511,773	926,560	(g) 1,432	557,685	1,104,145	18,949
Electricity generated for own use.....K.W.H.	1,346,927	30,218,700		1,300	32,899,706	
Electricity generated for sale.....K.W.H.	26,057	3,562,100			4,091,994	
Crude gold recovered.....crude ounces	49,746	106,965	559	39,067	99,881	(a) 358
Platinum recovered.....ounces	25			24		
Value of platinum recovered.....\$	840			938		
Quantity of material handled.....cu. yards	(h) 4,779,407	11,152,198	2,300	(h) 6,680,457	11,551,170	
Length of ditches.....miles	(b) 129	72		149	57	
Total gross value of alluvial products.....\$	1,455,413	3,051,829	16,345	1,192,481	2,915,450	
Fuel and electricity used (purchased).....\$	44,771	74,921		43,284	92,030	654
Process supplies used.....\$	30,535	60,075	(c)	39,022	18,556	764
Cost of freight and express on dust, nuggets, bullion, etc., shipped.....\$	2,487	33,050	(c)	1,887	40,741	
Cost of smelter, refinery and mint treatment on material shipped.....\$	5,271	67,503	(c)	5,448	56,294	
Total Net Value of Alluvial Products.....\$	1,372,349	2,816,280	16,345	1,102,840	2,707,829	

(f) In addition to the number shown in the table, there were numerous small operators from whom returns were not obtainable; subject to revision.

(a) Recoveries for Alberta and Saskatchewan represent receipts of crude gold from Alberta and Saskatchewan at the Royal Canadian Mint, Ottawa, and the Dominion Assay Office, Vancouver, B.C. No other statistics available.

(b) Includes flume; in use.

(c) Information not available.

(d) Value of crude gold in Canadian funds in 1939 was estimated to be \$29.24 per crude ounce. In 1940 it was \$30.50.

(e) Value of crude gold in Canadian funds in 1939 was estimated to be \$28.53 per crude ounce. In 1940 it was \$29.19.

(f) Value of crude gold in Canadian funds in 1939 was estimated to be \$29.24 per crude ounce. In 1940 it was \$30.50.

(g) Quebec only—data not available for Alberta and Saskatchewan.

(h) Partly estimated.

THE AURIFEROUS QUARTZ MINING INDUSTRY IN CANADA

The great part of the gold of Canada comes from the Canadian Shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of MacKenzie River. The area of the shield is roughly 1,825,000 square miles, almost half of Canada. The deposits of the shield are of two main types, namely, quartz veins, from which most of the gold, up to the present time, has been won, and sulphide deposits which produce a smaller but very considerable proportion. The second great source of gold in Canada has been the Western or Cordilleran section, comprising British Columbia and Yukon Territories; the gold production from this section includes relatively large quantities obtained from alluvial deposits. The third principal area in which gold deposits occur is the Acadian region of Eastern Canada, the metal occurring principally in Nova Scotia where it has been mined since 1862.

The number of Canadian gold mining firms reporting mining operations in 1940 totalled 428 compared with 455 in 1939; 80 in 1929 and 65 in 1923. During the year under review, there were 438 properties in operation compared with 474 in 1939; in 1940, 278 mines reported production as against 232 in 1939 and 33 in 1923.

The gross value of output for the entire industry and including the value of all recoverable metals, including gold, silver, etc., totalled \$178,790,485 in 1940 compared with \$160,014,172 in 1939. Of the 1940 total, \$122,675,051 were contributed by mines in Ontario, \$29,003,738 by mines in Quebec, and \$20,413,118 by the gold mines of British Columbia.

Employees in the lode gold mining industry totalled 31,405 compared with 30,622 in 1939 and 5,524 in 1923. Salaries and wages paid increased from a total of \$53,206,225 in 1939 to \$55,205,096 in 1940 and fuel and purchased electricity consumed by the industry during 1940 amounted to \$8,147,304 while the cost of explosives, drill steel and other process supplies used in the same period amounted to \$20,751,201.

Dividends paid during 1940, as computed from actual returns made by the lode gold mining industry, totalled \$39,431,890.

Nova Scotia Gold Mining Industry, 1940

(J. P. Messervey, Inspector of Metal Mines and Quarries, Nova Scotia Department of Mines)

The Rehabilitation Project commenced last year in the Fifteen Mile Stream Gold District was continued throughout the year 1940. This project was carried on jointly by the Department of Labor for Nova Scotia and the Federal Department of Labor to rehabilitate coal miners from the Thorburn area of Pictou County. All surface installations were completed early in the year and fairly extensive development work was carried out on the 90 foot level from the McLean shaft. This work along with the usual surface operations, including milling gave instruction and training to 140 men. Near the end of the year, straightening of the McLean shaft and sinking of the shaft to the 200 foot level was being carried out. Exploration work on the 200 foot level is expected to commence early in February.

The Mine Apprentice Project carried on at Chester Basin for about three years was closed during the winter of 1940. The war situation definitely changed the necessity for training youths in the art of hard rock mining. The project under normal conditions more than proved its worth and successfully trained hundreds of young men who were able to find immediate employment in the industry after completing their training.

Guysboro Mines Limited continued another year of successful operations at Goldenville. Underground developments were confined to the 400, 500 and 600 foot levels. The establishment of a sorting and crushing station between the 500 and 600 foot levels underground was completed about the end of the year replacing the old plant on the surface. Final touches to the buildings on the surface were also completed.

At Goldboro, Seal Harbor Gold Mines Limited, continued mining and milling operations at the rate of 250 tons per day. The main inclined winze was sunk for a length of 300 feet from the 550 foot level to the 625 foot and 700 foot levels. Development work will be carried out on these levels during 1941 along with continued sinking of the winze to lower levels.

Also at Goldboro, the Victoria Gold Mines Limited commenced work on the Victoria mine during the latter part of the year. Mining equipment buildings were erected on the surface and treatment of ore in the ten stamp mill of the Seal Harbor Gold Mine was begun in December.

The Consolidated Mining and Smelting Company carried on another year of successful operations at Caribou Mines. Stopping operations were confined to ore above the 500 foot level. A new ore body of extensive proportions was discovered and partially developed during the year.

Killag Gold Mines Limited carried on underground operations in the Killag Gold District for nine months of the year.

Avon Gold Mines Limited at Oldham carried out their original program and deepened the main inclined winze from the 675 foot level to the 925 foot level. Lateral development on the 550, 675, 800 and 925 foot levels was carried out.

Queens Mines Limited who commenced work in the Molega Gold District late in 1939 continued steady operations throughout the year. Original operations were carried out by a steam plant but this was supplanted by hydro electric power which was brought into the district last spring. Underground developments have been carried out on the 200 foot level and an initial ball mill unit of 15 tons capacity was installed during the summer.

L. H. Douglas continued with small scale operations at Whiteburn during the year. This operation has carried on steadily for the past four years.

Interest in the development of the gold fields of the province has increased considerably.

New Brunswick

(New Brunswick Department of Lands and Mines)

Gold prospects in Victoria County located on a road some fifteen miles from Wapske, and others on the Wapskehegan about three miles above the mouth of Sadler Brook were examined. The bed rock is well exposed by shallow pits. It consists of pinkish rhyolite with disseminated specs of pyrite, and of greenish diabase with specks and small vugs of pyrite. Four samples taken carried gold in quantities varying from 0.005 to 0.01 ounces per ton, and seven carried silver in quantities varying from 0.02 ounces to 0.06 ounces per ton. In most instances the samples represent large volumes of rock but the values were so low that further work was not encouraged.

The Gold Industry in Quebec in 1940

(A. O. Dufresne, Deputy Minister)

The province of Quebec still holds second place among the provinces of the Dominion with a gold production (shipments) valued at \$39,169,361 from 1,017,386 ounces for the year 1940. This is an increase over the previous year of close to 7% weight, and 14% in value.

A total of 29 regular mines contributed to this production, all of which are located in that region extending 100 miles westward of Larder Lake to the Bell River. Of these mines, eleven produced over a million dollars in gold and six others were within 50% of that mark. In order of importance they are Noranda, Lamaque, East Malartic, Beattie, Sigma, Perron, Siscoe, Malartic Goldfields, Sullivan, Canadian Malartic, O'Brien, Powell-Rouyn, Belleterre, Sladen Malartic, Stadacona, Cournoir and Wood Cadillac.

There are two main types of ores out of which gold is extracted. These are the "straight gold ores" and the "complex sulphide ore bodies". In the first type the gold is found in quartz or highly silicified gangue, and in the second it occurs in replacement lenses of iron, copper and zinc sulphides, out of which copper and zinc are also produced. The percentage of gold derived from deposits of the first type represents 74% of the total in 1940 against 72% in the previous year.

Staking of claims fell off about 40% from 1939 when the number of claims recorded totalled 8,781. In 1938 the number was 11,320 and during the record year of 1937 it was 18,641.

The Amm, Mooshla and Arntfield ceased producing during 1940, while Pandora and Senator-Rouyn registered their first production of bullion. However, in the case of Arntfield, the halt in production was only temporary, and the mill treated the Senator-Rouyn ore. (At May, 1941 Arntfield had resumed milling its own ore while Senator-Rouyn completed construction of a mill on its property.)

Rouyn Area.—Aldermac, Noranda and Waite Amulet, (as also Normetal in the Desmeloizes Area) are the only gold producers working on complex sulphide ores. At Arntfield, from October 12th to the end of the year the mill was operated on a lease arrangement for the treatment of Senator-Rouyn ore, while development underground was pushed in a search for new ore bodies. Francoeur milled an average of 180 tons during the year. Underground development of No. 8 zone was carried out from the second level of the main zone. The new zone lies 800 feet North and had been tested in 1939 by diamond drilling. The McWatters mine increased the tonnage treated by about 30% for a daily average of 120 tons. A reduction in grade has resulted in a correspondingly longer life expectancy. At Powell-Rouyn No. 2 shaft was completed and reached a depth of 1,725 feet. At 1,900 feet south-east of it, No. 3 shaft was commenced with the object of mining a large body of low-grade siliceous ore. A 450 ton treatment plan was constructed and put in operation during September. Senator-Rouyn entered the class of gold producers; the ore was shipped to the Arntfield mill while construction of its own mill and plant additions were in progress. The Senator-Rouyn mill was in operation as scheduled in the latter part of April, 1941. The property of Stadacona-Rouyn continued operations during the year under a receiver-ship. An average of 400 tons of ore were milled during the year.

Duparquet Area.—The Beattie mine is still the only producer in this area. The milling rate was maintained at 1,700 tons per day.

Bousquet-Cadillac Area.—During the first six months of the year, 4,901 tons of high grade ore were shipped from the Mooshla to the Noranda Smelter. The Amm mine ceased to operate about July, but the mill was continued in operation by Pandora-Cadillac; its ore being trucked from the No. 2 and No. 3 shaft areas. Central Cadillac also used motor transport for its ore, and 59,400 tons were thus sent to the Thompson Cadillac mill for treatment. In addition, 2,723 tons of Kewagama ore accumulated on surface from past development work were also hauled to the Thompson mill as a result of an arrangement between Central and Kewagama. The mill continued to operate normally at Lapa Cadillac with an average daily tonnage of 265 tons. At the O'Brien milling averaged 185 tons per day. Underground development is to be carried below the 2,000 foot level by an internal shaft. 90% of the mill feed at the Wood Cadillac came from the magnetite-jasper orebody; a total of 76,745 tons of ore were treated during the year.

Mud Lake Area.—The only producer in this area was Belleterre, a subsidiary of McIntyre Porcupine Gold Mines Ltd. During the year 88,281 tons of gold ore were milled; the mill capacity having been increased from 200 to 300 tons per day.

Malartic Area.—A daily average of about 750 tons were milled at Canadian Malartic. This constitutes an increase over the 1939 average of 675 tons. Improved position in ore reserves will permit a plant capacity of 1,000 tons per day. At the East Malartic an average milling rate of 1,483 tons was maintained as against 969 tons per day in the previous year. Ore reserves are estimated at close to 2,500,000 tons grading \$6.45 in gold. The mill capacity at Malartic Gold-fields was increased from 300 to 600 tons and it is expected that minor additions will bring it up to 1,000. For the year 1940 a total of 150,201 tons of gold ore were treated for a recovery of 33,942 ounces. Sladen Malartic milled an average of 650 tons of ore per day; underground development was carried out from the 350 foot level into National Malartic ground where 4,357 tons of development ore were taken out and treated in the Sladen mill.

Dubuisson-Bourlamaque Area.—Siscoe hoisted an average of 640 tons of ore per day out of which about 110 tons were sorted out and discarded as waste. A policy of outside exploration was carried out during the year and it is reported that forty-five prospects were examined. At Sullivan, milling was maintained at a rate of 340 tons per day. An average of 1,218 tons of ore were treated daily at the Lamaque mine; No. 2 shaft was further deepened in April and at the year's end had reached a depth of 2,816 feet. The new hoist equipment at No. 2 shaft of Sigma was completed in the latter part of the year, and will be capable of handling over 1,000 tons to a depth of 3,000 feet. Milling operations during the year averaged 765 tons per day.

Pascal-Louvencourt Area.—During the year Perron deepened its No. 5 shaft another 800 feet, down six new stations to the 1,875 foot level. The daily milling rate averaged 385 tons. At the Courmor the mill treated 200 tons of ore per day. About two-thirds of this ore came from the adjoining Beaufor workings.

There was a good deal of activity in the field of exploration and development in practically all localities of Western Quebec. Several properties were examined under options or similar arrangements by Sullivan, Teck Exploration, Siscoe, Anglo Huronian, Inspiration, Toburn, Kirkland Lake, Howey, Consolidated Mining & Smelting, McIntyre and many others. Underground development was carried out at the Mic Mac, West Malartic, Central Mining, Kiena, Pascalis. At the Flordin in Desjardins Township work was done on the 200 and 350 foot levels, but operations were suspended in December. Drifting on the 200 foot level at Senore, next to the Perron mine, opened up four ore showings. Work was suspended in July, however. Underground lateral work and diamond drilling was reported at Lacoma until the month of June when operations were halted.

Gold Mines of Ontario—1940

(Maurice Tremblay—Ontario Department of Mines)

Gold Mines of Southeastern Ontario.—The spurt of activity in the gold mining areas of southeastern Ontario which was manifested by the production of one gold mine and development work at two other properties in 1939, died down in 1940. At the Addington mine of Consolidated Mining and Smelting Company, the old mill was dismantled and pulled down. The same mother company which had operated the Cordova mine decided to shut down and abandon the property on July 30, 1940. This property milled 26,526 tons of ore, 2,071 of which came from surface dumps. The Cordova mill equipment moved to Yellowknife in the Northwest Territories. Steady operations on a small scale were carried on throughout the year by the Mayboro Milling Company which developed a property which was formerly part of the old Diamond mine. The main shaft was deepened 50 feet to a total depth of 156 feet and a second level was established at a vertical depth of 135 feet. The mill treated 160 tons of ore in November and December.

Gold Mines of Larder Lake Area.—In this mining area which starts at the Quebec boundary and extends as far west as the Kirkland Lake area proper, activity centered at the three producing mines, Kerr Addison, Chesterville and Omega. Some development work was done at Cheminis Gold Mines Limited, but operations were suspended in August, 1940. Additions to the steel shop, electric shop and heating plant were made at the Kerr Addison Mines Limited, and a new steel and tile hoist house was built for the new 10-foot Nordberg hoist for the cage and skip assemblies. The mill capacity was increased in the latter part of the year in preparation for an eventual daily tonnage of 1,800 tons. In 1940 the lowest level under development was at 1,450 feet. Average mill tonnage at Kerr Addison was 1,221.6 tons. Chesterville Larder Lake Gold Mining Company erected a new tile and concrete hoist house for the C.I.R. double-drum 4" x 8" hoist acquired from Sylvanite Gold Mines. The mill and steel shop were enlarged. A new steel headframe was under construction at the end of the year and the average mill tonnage reached 600 tons per day.

Gold Mines of Kirkland Lake Belt.—The Kirkland Lake area proper embraces Teck and Lebel Townships and parts of the Townships in the east, north and west. For convenience, adjoining areas in the district of Timiskaming (exclusive of the Larder Lake and Matachewan areas) are grouped together under the designation Krikland Lake "Belt". The number 2 shaft at Macassa Mines Limited was sunk 1,195 feet to complete it to 4,070-foot depth, and stations were established at 3,000, 3,350 and thereafter at 125-foot intervals to 4,000 feet. The number 1 winze was sunk 450 feet to the 4,310 horizon and levels were established at 3,875, 4,000, 4,125, and 4,250 feet. The number 2 shaft is now connected to the main workings on the 3,000, 3,350, 3,475, 3,600 and 3,725 levels. Three residences and enlargements of the steel shops plus the construction of an iron and steel warehouse were added to the buildings already erected at the property. The lowest stoping level was at 3,725 feet. During 1940 the cross-cut from No. 1 winze on the 2,600-foot level was driven under the No. 2 main shaft at Kirkland Lake Gold. The shaft was raised to connect with the former sump below 2,475 feet and 45-foot sump was sunk below the 2,600-foot level where ore-pockets were installed. An ore-pass was also raised to the 2,475-foot level. In the No. 2 main shaft combination cages and skips were installed. Mill tonnage was maintained at 400 tons per day from the middle of the summer to the end of the year. There was nothing outstanding at Teck-Hughes Gold Mines, Limited. The mill treated one per day. At the Lake Shore Mine sinking operations at the No. 6 shaft were temporarily

halted 50 feet below the 4,700-foot level. No. 4 shaft was sunk 1,434 feet to the 5,760 horizon and levels were established at 125-foot intervals from the 5,200-foot level to the 5,700-foot level. Sinking is continuing in 1941. A double-deck cage was installed in the fourth compartment of No. 5 winze, in balance with the counter weight in the manway at the Wright-Hargreaves mine. The hoist for the winze is on the 3,900-foot level. The fourth compartment in question was formerly a ventilation compartment. Development was spread over all levels except nine between the 200-foot level and the 6,300-foot level. The mill averaged 1,210 tons per day during the year. A new hoist with a capacity of 28,000 pounds and with a rope speed of 1,560 feet per minute equipped fully with safety devices was installed at the Sylvanite mine. Work was continued during the year on the No. 5 winze which is collared at the 3,150 level. A new 3,300 V. power cable was installed from surface down No. 2 shaft to the 3,150 level and to the No. 5 winze. It is expected that the winze will be sunk continuously to the 5,150 level. The mill treated an average of 580 tons per day during 1940 which constitutes an increase of 145 tons per day over the comparable period of 1939. After the sub-shaft was sunk 6,336 feet during 1940, levels were established at 125-foot intervals from the 1,975-foot level to the 2,475-foot level at the Toburn Gold Mine. A double-drum, 10,000 pound pull hoist was installed on the 1,080 level to serve the sub-shaft. A new steel headframe was erected over the main shaft and a new hoist room was built. The company also purchased a new hoist similar to the winze hoist and a new time office and warehouse was erected. The mill treated an average of 163 tons per day over the year. Toburn also carried out some exploration at Federal Kirkland Mining Co. from their own workings. At the Amalgamated Kirkland Mines, Limited, property (formerly Kirkland Hunton Gold Mines) it was expected that the underground drive from the Macassa mine would reach the property by the end of 1941. Macassa was also driving underground towards the Casakirk Gold Mines Ltd. property. Surface exploration was done at the Miles Martin Kirkland Gold Mines under the direction of Kirkland Hudson Bay Gold Mines Ltd. During 1940 the No. 2 winze at Bidgood Kirkland Gold Mines, Limited, was sunk 174 feet and levels were established at 1,900 feet and 20–25 feet horizons. Several highgrade ore bodies were worked on the 900-foot horizon of the No. 2 workings after the winze there had been sunk 100 feet. The section in question is now connected with the 1,025-foot level. Average daily tonnage milled during the year was 138 tons. At the Upper Canada Mines' property where the average milling rate for the year was 183 tons per day, the shaft was deepened 252 feet and levels were established at 875 feet and 1,000 feet. Brock Gold Mines was also active during the period under review. A 3-compartment shaft was sunk 220 feet and a level was established at the 200-foot horizon. Prior to suspension of operations at the Anoki Gold Mines, the shaft at that property was deepened 254 feet to a depth of 754 feet and levels were established at 600 feet and 735 feet. There was very little development at the Omega Gold Mines, Limited property and outside of the installation of mill ventilation equipment, there was little new to report. The mill treated on the average 472 tons of ore per day. Some surface work only was done at Raven River Mines, Limited (Laguerre Gold Mines, Limited). Wolfe Lake Gold Mines, Limited, which is a reorganization of Lakeland Gold Mines, carried on minor operations. The No. 2 shaft was dewatered and sampled. No work was being done at the end of the year. Golden Gate Mining Company in the Goldthorpe-Swastika Section sunk its No. 2 shaft 349 feet and levels were established at 725, 850, and 975 feet. Mining of a flat vein on the Crescent Kirkland Gold Mines' property which was acquired by Golden Gate is being carried on through an adit. The mill averaged 70 tons per day throughout the year. Yama Gold Mines confined its developments to two levels, one at 375 feet and the other at 500 feet. These levels were established after the shaft had been deepened to the 520-foot horizon. Yama was the only active property in the Boston Creek Section.

Gold Mines of Porcupine Belt.—Aunor Gold Mines, Limited shipped bullion for the first time in January, 1940. During the balance of the year the average tonnage milled was 363 tons. Development work was inaugurated at the Bonetal Gold Mines, Limited. This Company had been incorporated on November 10, 1936, sinking of a three-compartment shaft was commenced and a temporary mining plant was installed. A modern mining plant was later assembled and by the end of the year the plant installation was nearing completion. Broulan Porcupine Mines, Limited, which had forwarded ore for treatment to the Old Mace mill completed the erection of a new mill during 1940. The Mace mill is now idle for the first time in many years. Activity at the Buffalo Ankerite Gold Mines, Limited was transferred from the No. 2 shaft to the No. 5 shaft upon the completion of a new crushing plant underground and grinding on the

surface. An excellent miners' change house and a central heating plant was also erected in the vicinity of No. 5 shaft. The Company also completed a connection between No. 5 shaft and the deepest workings of the older part of the mine. This connection has been of great interest to mining men locally as well as to visitors from foreign mining fields because of the nature of the ground traversed and the methods used to accomplish it. The most difficult ground was serpentine and the trouble resulted from the swelling of the ground. In timbering the combinations of huge timber and steel beams were not sufficient to keep the cross cut open. This was finally accomplished by using steel rings covered with concrete reinforced with 30" track rails. The steel rings had to be kept close to the face at all times. The rails outside the rings were used in short lengths. These were inserted in holes dug around the outside of the face in such a way as to give a lap joint at each ring. Another new addition to the list of gold producers in the Porcupine district, Faymar Porcupine Gold Mines, Limited, turned over its new mill at the beginning of April. This Company treated an average of 180 tons of ore from its mine workings plus an additional 50 tons from the adjoining property of Nakhodas Mining Company, Limited. The first concrete headframe ever to be used at a Canadian mine was erected during 1940 at the Hollinger Consolidated Gold Mines, Limited. This headframe is unique both as to design and as to its enormous size. It was expected to be put into operation about April or May of 1941. This shaft would then become the main ore shaft of this great mine. The Ross mine which is operated by Hollinger Consolidated Gold Mines, Limited, saw some improvement during the year. Late in 1940 a new and larger headframe was under construction. A community hall and a curling rink for the benefit of the employees were also built. Hoyle Gold Mines, Limited, completed initial development and decided to build a 500-ton mill, the erection of which was completed just after the end of the year. Nakhodas Mining Company, Limited acquired a single claim in Tisdale Township in 1940. Years ago a shaft was sunk on this claim to a depth of 229 feet but no levels were opened. Installation of a plant was commenced in May and in July ore shipments were made to the Faymar Porcupine Mine. During the latter part of the year, the Nakhodas mined about 300 tons of ore weekly. Added attention was given to exploration within porphyry masses at the McIntyre Porcupine Mines, Limited and from 4,500 feet of drifting was developed 100 feet of ore averaging 0.29 ounces over drift width. It must be remembered that prior to 1939 the Company had never found any worthwhile ore deposits in the porphyry masses on the property. Development at the Pamour Porcupine Mines, Limited, property in 1940 consisted of drifting east on the 800, 1,000, 1,200, 1,400 and 1,600-foot levels and west on the 400, 600 and 1,400-foot levels. A curling rink was built at this mine for the use of employees of the mine as well as those of the adjacent Hallnor mine. Hallnor Mines, Limited, completed 35,273 feet of diamond-drilling during 1940. During the period under review, raising was done on the 1st, 2nd, 5th, 6th, 7th and 8th levels. The ore pass raise was completed to the skip-loading pocket between the 8th and 9th levels. Grizzlies and control shutes were installed on the 5th, 6th, 7th and 8th levels. All diamond-drilling was done underground with 289 holes which gave the total length mentioned earlier. Following the loss by fire of the old mining plant, Jodela Gold Mines, Limited, installed a new mining plant and replaced the former headframe by a much larger structure. Evidence of the tremendous growth of Porcupine over recent years is indicated by labour statistics. The increase of employment in the mines in 1940 was 6.7 per cent over the comparable figures for 1939. The increase over the number employed in 1935 is over 60 per cent. The increase in tonnage milled in 1940 over that of 1935 was 51 per cent.

Gold Mines of Matachewan and West Shiningtree Areas.—In the Elk Lake, Gowganda, Tyrrell Section, the main shaft at Tyrannite Mines, Limited was sunk 310 feet to the 853-foot horizon and levels were established at 675 and 825 feet. Additions were made to the mill and compressor house. Average mill tonnage was 218 tons per day. The No. 2 shaft (winze) at Young-Davidson was sunk 206 feet to the 1,109-foot horizon and a level was established at 1,063-foot horizon. The main shaft was deepened 135 feet and the fifth level established at the 1,060-foot horizon. The mill treated an average of 1,014 tons per day. A tunnel was driven to divert Davidson Creek. Matachewan Consolidated treated an average of 497 tons per day in its mill. Some cross cutting was done on the 215-foot level of the Arbade Gold Mines, Limited which was in operation from January 1 to April 26.

Gold Mines of Sudbury and Nipissing Districts.—The mine and the mill of New Golden Rose were operated throughout the year. Stopping was principally confined to the 4th level. A 2-compartment winze was sunk from the 5th level to an inclined depth of 398 feet, and stations

were cut for the 6th and 7th levels at vertical intervals of 125 feet. Development work at the Jerome Gold Mine was carried on throughout the year on the 200, 350 and 500-foot levels. Preparations were made for the construction of a 500-ton mill during 1941.

Gold Mines of Algoma District.—At the Cline Lake Gold mine shrinkage stopes were mined on the 125, 250, 400 and 500-foot levels. The shaft was sunk 675 feet to a total depth of 1,196 feet and levels were established at 725, 875, 1,025 and 1,175 feet. Development work was carried on at the Maginot Gold Mines (Algoma Summit) from January until June. All work was done on the 2nd level. The mill was not operating.

Thunder Bay District.—Tombill Gold Mines, Limited continued to produce at the rate of 100 tons daily during the year. An exploration drift was being driven to the north of the main drift on the 1st level. Towards the end of the year MacLeod-Cockshutt continued to produce at the rate of roughly 670 tons daily from which 150 tons of concentrates were sent to the roasting plant. Erection of the plant was begun late in 1939 and the first roasting unit capable of handling 50 tons daily went into service in the middle of February. A second and similar unit was inaugurated in March and a third on June 15th. The mining method employed at MacLeod-Cockshutt is horizontal cut-and-fill and the bulk of the ore has been obtained from the north ore body. Exploration by diamond-drilling and drifting on the 5th level to explore the south ore zone was very fruitful and drifting west on the 3rd and 5th levels towards the old No. 1 shaft met with an unusual success. This particular ore can be treated directly by cyanide without roasting. At the end of the year both No. 1 and No. 2 shafts were being deepened. Magnet Consolidated Gold Mines, Limited added a cyanide unit to the flotation-amalgamation mill which went into operation on July 2. A secondary crushing plant was also added. Shaft sinking below the 780-foot horizon commenced in December, 1939 was completed to 1,115 feet by March 1, 1940, with two new levels developed at 930 and 1,010 feet. Little Long Lac Gold Mines, Limited, increased their daily production from 300 tons at the end of 1939 to 315 tons in 1940. Mining was carried on in 13 stopes. It was proposed to sink a winze to mine the west ore below the 2,200-foot level. The winze is located some 1,500 feet west of the main shaft. Mining an old ore section in the south vein, considered to be too low-grade to be worked at a profit, was resumed on the 200-foot level. Jellicoe Mines (1939) Limited, operated part of the year to recover the remainder of a small high-grade ore body, the profits being used to carry out additional exploration by diamond-drilling and lateral development. There was little success in this endeavour and all work was definitely suspended on August 9. The ore was treated by the Magnet and latterly by the Bankfield mill. A new hoist was installed during June to service the No. 2 shaft at Hard Rock Gold Mines. This property was treating 350 tons of sorted ore daily at the end of the year. The roasting plant handles 80 tons of concentrates per day. Development work was carried on outside the north ore zone which has supplied the bulk of the ore to date. The No. 2 winze located some 1,100 feet northwest of No. 2 shaft was sunk below the 475 level and was completed by the end of September. New levels were established at the 625 and 775 horizons. Bankfield Consolidated Mines, Limited increased its tonnage from 100 to 120 tons up to May and again to 135 tons by the end of the year. Mining was carried on by shrinkage methods on one stope on the 1,025-foot level and one on the 150-foot level. The surface pillar of 1,010-foot stope was removed. Operations on all other levels were confined to drawing off broken muck. The winze was deepened early in the year below the 1,025-foot level to 1,275 feet to open up new levels at 1,150 and 1,275 feet and drifting towards the Tombill boundary followed in the hope that the extension of the Tombill structure would make ore on the Bankfield property. This was not successful. In the Beardmore and Sturgeon areas of the Thunder Bay District, Leitch Gold Mines, Limited treated an average of 85 tons of ore daily. In July sinking below the 1,025-foot level was inaugurated with an objective of 1,650 feet. The sinking was completed in December. The shaft at the Northern Empire Mines Company, Limited was deepened from April 16 to the end of the year. Ore was obtained by resuming cut-and-fill methods. Other development at this property consisted of a drift on the 1,700-foot level which is being driven under contract for the Spooner Gold Mines. It was planned to do some 2,000 feet of lateral work at this latter property. Northern Empire treated an average of 185 tons daily. Development was carried out to the east of the shaft on the property of Sand River Gold Mining Company Limited. A narrow length of ore was found and was reported to be better than .61 ounces. Subsequently the same ore which had been found on the 1,150-foot level was looked for on the 900-foot level.

This ore is somewhat of especial importance as all ore mined to date was found west of the shaft below the 650-foot level. Leitch Gold Mine was in charge of surface exploration at the Halport Gold Mines, Limited property. From 8 to 10 men worked between March and September and 5,000 feet of diamond-drilling was completed. Three new levels were established at Sturgeon River Gold Mines, Limited after the shaft had been deepened to 1,775 feet. The mine operated continuously during the year and treated an average of 75 tons of ore daily. In the Sturgeon and Savant Lake Areas, St. Anthony Gold Mines produced throughout the year at an increased rate of 170 tons daily. The shortage of power was relieved somewhat by the installation of a new Diesel power unit in December, 1939. A 2-compartment vertical winze was completed to 262 feet by March 20. Two new levels were established at 875 and 1,000 feet. Mining was carried on at the north end of old stopes on all levels above the 750, and these consisted of salvage operations. Wide interest was aroused over a new gold discovery in Poisson and Jutten Townships in the Savant Lake area on the west side of Savant Lake which is about 20 miles north of the Canadian National station, Savant Lake. Gold was reported in sediments late in September by prospectors of the Northern Canada Mines, Limited. The greenstones of this area had received some attention years before, but nothing of note had ever been discovered. Many prominent companies were soon in this field. About 400 claims were staked and recorded but in 1940 little thorough prospecting was done. There is no known main break but the general strike is east of north. A number of small free gold showings have been found on the stakings along the west shore of the south half of Savant Lake.

Gold Mines of Patricia Portion of Kenora District.—Efforts to locate new ore at Sachigo River failed in 1940. The mill treated an average of 45 tons of sorted ore daily. The shaft was completed to 840 feet by January and again deepened to 1,130 feet with levels established at 800, 950 and 1,100 feet. Development followed on the new levels with little success and plans were to mine and mill the remaining ore and close the property. It was shown earlier that work on the 800-foot level indicated the ore to be cut between the 650 and 800-foot levels. Berens River Mines, Limited, in the Favourable Lake Area, treated an average of 225 tons of ore daily which was obtained from shrinkage stopes on all levels down to the 500-foot horizon. Ore-passes and a loading pocket below the 375-foot level are used to handle ore from levels above. The shaft was deepened below the 500-foot level to 972 feet and three new levels were established. A loading pocket was installed below the 800-foot level and development on an ore pass system to handle ore below the 375-foot level was in progress. Workmen's and staff houses were built during the year as well as an 8-apartment house and a residence for the manager. Less than one year after the mill was completed Cochenour-Willans Gold Mines, Limited, in the Red Lake Area, paid an initial dividend. The mill treated an average of 150 tons of ore obtained from open stopes on all three levels. Flotation units have been added to the mill to treat the tailings from which three to four tons of concentrates are obtained each day. These are then shipped to the smelter during the summer. The concentrates have a value of about \$8,000 per month. Operations at the Gold Eagle property were continuous throughout the year. Ore was obtained from the removal of the 125-foot level floor and from new stopes to the east of the old workings as well as from old pillars left in worked-out stopes. Exploration by diamond-drilling and lateral work with the view to picking up Gold Eagle or McKenzie shearings at 850 and 1,000 feet, met with little success. The new levels had been opened after the winze had been deepened to 1,036 feet. In September, 1940, Gold Frontier Mines, Limited, successor to Frontier Red Lake Gold Mines, Limited, sent a crew of men to dewater the mine which is located one mile east of Pipestone Bay at the west end of Red Lake. It was expected that some development work would be carried on at the two levels which had been worked in 1936. Hasaga Gold Mines, after having pushed development on new levels, was milling at the rate of 350 tons of ore by November. Development work at the new No. 2 operation, also known as the Starratt-Olsen property, was continued until March 31st when operations ceased. The mine was idle at the end of the year. Howey Gold Mines, Limited, treated 1,250 tons of sorted ore daily from 1,500 tons of hoisted ore. This came chiefly from the stopes on the 1,350-foot level. Removal of the surface pillar was completed and the only other mining centered around a new ore section east of the old workings between the 1,315 and 1,000-foot level. By the end of 1940 all ore had been mined from the 200-foot level to the surface at Madsen Red Lake Gold Mines, Limited. Shaft sinking was completed below the 500-foot level on January 29, following which new levels were established at 650 and 800-foot horizons. Sinking was again resumed in August with a

proposed depth of 1,305 feet. At the end of the year a new hoist and headframe were being installed. McKenzie Red Lake Gold Mines, Limited, continued production throughout the year at a daily average tonnage of slightly more than 200 tons. Mining was carried on by open stope methods on all levels between 450 and 750 feet. McKenzie also directed and financed McMarmac Gold Mines, Ltd., to production in 1940. Exploration by diamond-drilling and development at the McKenzie property resulted in the outlining of ore on all levels up to the 450-foot level. The deepest work was done on the 1,050-foot level. New possibilities for the property were also indicated by discovery of new ore about 1,000 feet north and east of the shaft on the 650, 850 and 1,050-foot levels. Following the deepening of the shaft to 325 feet, McMarmac Red Lake Gold Mines, Limited, established a new level at 300 feet by the end of 1939. Development was carried on on both the 160 and 300-foot levels and by September sufficient ore had been indicated to warrant the installation of a 75-ton mill. The shaft was deepened further to establish a new level at 450 feet during mill erection and installation of equipment. The mill went into production in October and the flow-sheet includes flotation, amalgamation and cyanidation. In the Uchi Lake area, Uchi Gold Mines added flotation and re-grind units as well as a sorting plant to the mill. Mining was carried on by shrinkage stoping on all levels down to the 600-foot level. Shaft sinking below the 600-foot level at the No. 2 shaft was completed to 1,170 feet. During the third week in August, the capitalization was increased from 3 to 5 million shares in order to take over and operate adjoining Hammell, Hanalda and Jalda properties whereby the tonnage could be increased to 1,000 tons daily. Development was carried on at the Hanalda and Jalda properties. Following the merger with Uchi Gold Mines, Limited, Hanalda and Jalda workings were dewatered starting September 30 and the mines prepared for production. By the year-end, the Hanalda was shipping 100 tons to the Uchi mill by trucks. Uchi also obtained an option on the Grasset property operated by Consolidated Mining & Smelting some years ago. Uchi dewatered the shaft at this property and installed a new shaft collar. The Hanalda is known as Uchi No. 3 operation, the Jalda, No. 4, and the Grasset, No. 5. In the Woman Lake area, J. M. Consolidated Gold Mines, Limited, operated their mill at 100 tons daily until the end of February when ore reserves were exhausted. Exploration by diamond drilling followed on the 600-foot level with little success. All work was definitely suspended on April 24. In the Birch Lake area, Jason Mines, Limited, successor to Argosy, renovated the old mill and commenced operations on June 16. The first brick was poured on July 13. Hydro power from the Ear Falls-Uchi line was delivered to the property early in April. No. 1 shaft was deepened from 404 feet to 530 feet and a fourth level opened at 510 feet. June saw the start of dewatering at the No. 2 or Argosy workings. Some 125 tons of ore are milled daily, of which 70 tons are obtained from the stopes on the 2nd and 3rd levels of No. 1 shaft and trucked to the mill. The balance is obtained from No. 2 shaft stopes on the 2nd and 3rd levels.

Pickle Crow Area.—In the Pickle Crow Area, work at the Albany River property was concentrated on the 625-foot level and consisted of exploration by diamond-drilling and drifting to the west towards the east drive of the Pickle Crow Gold Mines' 750-foot level. Production at the Central Patricia Gold Mine came chiefly from the levels between the 750 and 1,450-foot horizons. The mill treated an average of 325 tons of sorted ore daily. An extension was made to the mill to provide for additional equipment and ore storage to increase the tonnage to 400 tons. The Springer or No. 2 operation, continued to truck ore to the mill at the rate of 30 tons per day until the end of May when all work was suspended and the mine allowed to flood. Another all steel headframe was erected at Pickle Crow Gold Mines, Limited, and the mill treated ore at the rate of 325 tons daily. Exploration to the east on the 750-foot level continued and by the end of the year considerable new high-grade ore was exposed. In September, shaft sinking was resumed below the 1,950-foot horizon with an ultimate objective of 3,000 feet.

Gold Mines of Kenora District.—Kenricia Gold Mines, Limited, produced at the rate of 100 tons daily until May 31 when operations ceased. The milling equipment was removed and the mill building dismantled and shipped to the Hoyle Gold Mine in Porcupine. The compressors and hoist were sent to Little Long Lac. During March and April, Kenricia did some customs milling for the Sunbeam Kirkland Gold Mines. Kenwest Gold Mines, Limited, was formed to operate the Big Master Consolidated Gold Mines property for Selby Lake Gold Mines who had an option on the Big Master. On July 23 shareholders of the Big Master company agreed to surrender their charter and transfer their assets to the new company. Owing to low water, it

was necessary to build a new road 9 miles in length to connect with Wabigoon Lake to get supplies to the property. Slashing got under way in October and was completed to the 350-foot level after which sinking was started. Kenopo Mining and Milling Company Limited, operated spasmodically during the year and treated small lots of ore received from high-grading operations around Kenora. The ore came from the following properties: Eldiver, near Black Sturgeon Lake; White, near Hilly Lake six miles east of Kenora; Silverman (Breakneck Mine) eight miles east of Kenora; and C. Alcock claims at High Lake, six miles south of the Trans-Canada Highway near the Manitoba boundary. Goldwood Gold Mines is the latest name for the Horseshoe or Kenland property at Regina Bay, fifty miles south of Kenora. Kenland sold the property to Goldwood Gold Mines for a stock consideration. On November 29, a lease was given to J. D. Shannon who checked samples on the 1st, 2nd and 3rd levels. No other work was in progress at the year end. Surface work was done at the White property and at the Silverman property by LaRae Exploration Company, Limited. Eldiver property was worked for the last time in 1893 when operations were suspended as a result of a fire. A shaft was reported to have been sunk to a depth of 108 feet on a quartz vein at that time. In July, 1940, the shaft was dewatered and sampled after which more work was done for Pioneer Gold interests. Some 60 tons of ore were shipped to the Kenopo mill. Mining was suspended at Straw Lake Beach Gold Mines, Limited, September 16, 1939, and the mill was shut down, but early in 1940 the shaft with levels at 100, 300 and 425-foot depths was deepened from 425 to 600 feet and levels established at 465 and 575-foot depths. Sinking was resumed and the 700-foot level was opened. Milling was resumed on September 17 at about 60 tons daily. Wendigo Gold Mines, Limited, paid its first dividend on December 1st after having produced throughout the year just over 100 tons of ore per day. At the end of the year a winze below the 1,100-foot level was being considered.

Gold Mines of Rainy River District.—During 1940 two former gold operations were reopened, one of which, the Upper Seine Gold Mine, went into production again while the second, the Orelia Gold Mines, Limited, working in conjunction with the lower Seine Mining Company, Limited, and Minerals Milling, Limited, just failed to make it.

Manitoba Gold Industry, 1940

(Geo. E. Cole, Director of Mines)

The production of gold in Manitoba during 1940 totalled 152,375 ounces as compared with 180,875 ounces for 1939, the decrease being accounted for by operations being discontinued at the Gurney and Laguna mines towards the end of 1939.

Gold was produced at eight gold-quartz properties and was also obtained in the treatment of base metal ores of the Flin Flon and Sherritt Gordon mines.

An important development at God's Lake was the commencement of the new No. 2 shaft located 6,000 feet west of the original No. 1 shaft. The decision to sink the new shaft was based on encouraging diamond drilling results. The tuff bed in which the vein system was encountered was at 860 feet instead of 1,100 feet as had been previously expected. Sinking operations were begun in June and the objective of 1,850 feet is expected to be reached in June, 1941. At the end of the year the shaft had passed the half-way mark.

San Antonio carried out the heaviest development campaign of its history during 1940. Early in the year a three-compartment winze was sunk 912 feet below the 10th level, opening up six new levels. In November it was decided to increase the mill capacity from 330 to 550 tons a day, following the disclosure of ore of major importance at depth. Construction will be undertaken some time in April, 1941 and the mill will probably be operating at its new capacity by early fall. During 1940, 36,745 ounces of gold were produced and ore reserves were very substantially increased.

Gunnar mine set a new record with a production of \$666,872 from 51,992 tons compared with \$662,010 from 49,036 tons in 1939. Plans are being made to deepen the shaft and open up two new levels at 1,875 feet and 2,000 feet.

Payment of dividends was continued by San Antonio, Gunnar and God's Lake during 1940.

In common with other provinces, there was a marked falling off of prospecting in Manitoba during 1940. In the southwestern part of the province some interest was shown in bog manganese deposits of recent origin, associated with shales of Cretaceous age. No large deposits of economic importance have as yet been discovered. In the Precambrian areas prospecting for gold and base metals continued in many widespread localities. Claims staked the previous year in the Last Hope Lake area were actively prospected by mining companies. Geological work was continued by the Dominion and the Provincial Governments during the year.

Owing to the difficulty of putting prospectors in the field and the opportunity for better employment of young men in industry, the Youth Training Scheme for training prospectors, which had been initiated successfully the previous year, was temporarily discontinued.

Saskatchewan Gold Mining Industry, 1940

(E. Swain, Supervisor of Mines)

In almost a decade gold mining in Saskatchewan has risen from nil to 103,751 ounces. The year marks the first time that gold production has exceeded 100,000 ounces. The advance in production represents an increase of 34.5 per cent over 1939 which was our last highest output. This increase is attributable to several factors, namely, one complete continuous year of operation of the "Box Mine" at Goldfields, which came into production about July 1, 1939; increased ore tonnage at the Hudson Bay Mining and Smelting Co. Limited mine at Flin Flon, which is due to the foresight of the management in improving the mine, mill and smelter as well as increasing the output of electrical energy; also the gold content of ore now being recovered is a little higher. Present values are expected to be recovered for some time to come. These are the principal factors contributing to the increase but other factors are the opening up of a prospect mine at Bootleg Lake by Henning Maloney Gold Mines Limited. This lake is some four miles southwest of Flin Flon; also the re-opening of the prospect mine on the west shore of Amisk Lake, formerly known as Monarch Gold Miners Syndicate Limited, by Pamon Gold Mines Limited. If satisfactory reserves of ore are ascertained, these companies will seriously consider putting in small mills. At the moment the ore recovered by both of these companies is being treated at the plant of the Hudson Bay Mining and Smelting Co. Limited, Flin Flon.

Placer gold output advanced a few ounces and has but little bearing on the total output. This gold is recovered from benches and bars in the North Saskatchewan River, when conditions are convenient to work such bars which move from point to point according to the vagaries of the stream.

The following prospect mines were idle:

Flin Flon Gold Mines Limited at Douglas Lake.

Athona Mines (1937) Limited at Goldfields.

A considerable amount of geophysical prospecting and geological work was undertaken in the Sulphide Lake area some six miles north of Lac la Ronge, the results of which are not definitely known. One individual, however, has signified his intention of working his most promising discovery, with a view to shipping out high-grade gold ore for treatment during 1941.

The mining road from Prince Albert to Lac la Ronge remains uncompleted but it is hoped that the road will be continued in the immediate future. Upon completion the terminal of Lac la Ronge would provide an ideal point from which to prospect the country, some of which is thought to hold promise for discovery of useful metallics.

British Columbia Gold Mining Industry, 1940

(Philip B. Freeland, Chief Mining Engineer, British Columbia Department of Mines)

In the Atlin Mining Division, the Polaris-Taku Mining Company, Tulsequah River, continued operations and a total of 80,364 tons of ore was treated, and the concentrates shipped to Tacoma smelter.

The Portland Canal Mining Division in 1940 contributed a total of 384,000 tons. The Big Missouri Mill treated 212,112 tons; the Silbak-Premier 171,504 tons. Lessees were active at the Dunwell property, and small shipments from several other properties were made.

The Surf Inlet Consolidated Gold Mines Ltd. continued operations all year, and 39,437 tons were treated and concentrates shipped to Tacoma smelter.

The small property operated previously by the McDames Lake Mining Co. in the Stikine area, was closed during 1940.

In the Omineca Mining Division, a number of properties were worked by individuals, and some under development by companies under option. Most of the shippers sent small tonnages to the government sampling plant at Prince Rupert, and in turn the latter sent resulting products to the Tacoma smelter. Among the properties shipping were the Black Bull, D & N Group, Dome Mt., Duthie, Golden Eagle, Hazelton View, Hunter Basin, Hyland Basin and the Coronado. The total tonnage recorded as treated was 293 tons.

In the Kamloops area the Windpass was again worked by lessees. The Consolidated Nicola Goldfields Ltd. operated all the year and concentrates produced were shipped to Trail smelter. In the Vernon area the Kalamalka, Jumbo, and Monashee were operated intermittently. The main producers in the Osoyoos Division again were the Hedley Mascot, Nickel Plate (Kelowna Exploration Co.), Osoyoos Mines of Canada Ltd. and the Morning Star.

Other shippers were the Grandoro, King, Black Diamond, Gold Standard, Koh-i-Noor, Lucky Strike, Queen Mary, Silver King, Silver Moon, Silver Ring, Summit, Grandview and Twin Lakes.

Greenwood Mining Division again had numerous properties in the shipping list, and the main ones were the Union, Yankee Boy, Dentonia, Providence, No. 7, Granby (Phoenix), Carmi, Brooklyn-Stemwinder and the Amandy.

The Copper Mountain mine operated by the Granby Mining, Smelting & Power Co. Ltd. continued throughout the year, and the Grasshopper also was a producer in the Similkameen area.

The High Surprise was the main producer in the Ainsworth Division. The Lardeau division had the Meridian, True Fissure and the Winslow as shippers.

In the Nelson area the main producers were the Arlington (Oscarson), Bayonne, Gold Belt, Kootenay Belle, Relief Arlington, Reno, Sheep Creek, Ymir, Yankee Girl, Ymir Con. and lessees thereof. The Alpine, Nugget Motherlode, California, Granite-Poorman, Spokane, Venango, Venus-Juno, Clubine-Comstock, Harriet and Wilcox also produced a substantial amount in the aggregate.

In the Trail division, the Midnight mine, Juno, I.X.L. and Velvet combined with lessees of Rossland properties to make the total.

The Vidette and the Grange Consolidated mine were the only two producers in the Clinton Division.

The W.W.W. mine owned by K. J. Robinson, the Thistle worked by lessees, and the Hesquiat combined to make the total from the Alberni Division on Vancouver Island.

The Clayoquot division again was one of the main producing areas, through the activity continuing in Zeballos camp. The shipping list included Central Zeballos (controlled by Reno Gold Mines Ltd.), Mount Zeballos, Privateer, Spud Valley, White Star, C. D. (formerly Rey Oro), and several smaller shippers.

The division will no doubt see several new shippers in 1941, the Muskateer, Buccaneer and Homeward reaching the stage when shipments may soon be commenced.

In the Lillooet division, the Bralorne again was the leading gold producer of the province and during the year milled 191,412 tons of ore. The Pioneer milled 77,585 tons. The Minto was operated by Messrs. Evans & Davidson on a lease from the Minto Gold Mines, Ltd.

In the Nanaimo division several properties contributed to the total of 2,339 tons treated.

The New Westminster division with which is now included the former Yale division, contributed a small tonnage of gold ore to the Provincial total, from the Dawson and the Aufeas.

Britannia was the main contributor of gold in the Vancouver division; the Jagee and Silta which was operated by R. C. McCorkell.

Gold Mining in Northwest Territories, 1940

(C. S. Lord, Geological Survey, Department of Mines & Resources)

All gold produced in Northwest Territories in 1940 came from Yellowknife Bay on Great Slave Lake. Nearly all of it came from Con, Rycon and Negus mines, and the amount produced was substantially greater than in 1939. A 4,300 horsepower hydro-electric plant was completed on Prosperous Lake for Consolidated Mining and Smelting Company of Canada, Limited, and power delivered to Con mine over a 22-mile transmission line in January, 1941. Part of the surplus power available at this plant is expected to replace diesel power at the Negus, Ptarmigan, and Thompson-Lundmark properties. Most prospecting was done between Hidden and Desperation Lakes in the Beaulieu River area, and near Slemom Lake in the Snare River area. Prospecting activity was comparable to that of 1939 and it is estimated that 30 parties were in the field during the summer. Several gold deposits were found, mainly in the Beaulieu River area. A Mining Recorder's office was opened at Yellowknife.

Yellowknife Bay.—Con and Rycon mines are operated from a common plant by Consolidated Mining and Smelting Company of Canada, Limited. Ore reserves at Con mine were increased to 130,460 tons of probable ore containing 0.61 ounces of gold a ton, and 175,000 tons of indicated ore containing 0.37 ounces of gold a ton. No. 1 shaft was deepened from 541 feet to 1,011 feet and levels established at depths of 650, 800 and 950 feet. About 5,600 feet of lateral work was done in the mines during the year, mostly on the 375- and 500-foot levels. The capacity of the Con mill was increased to 175 tons a day. Most ore treated to date has come from Con mine above the 375-foot level. Much new ore is reported to have been located on the 500-foot level of the mine during 1940. It is reported to occur in bodies that are wider and of lower grade than the mine average, and may require special treatment. Ore from Rycon mine, 2,200 feet east of Con mine, was treated at the Con mill.

Negus mine increased its ore reserves to 21,710 tons as of July 31, 1940 and mill-heads during 1940 contained about one ounce of gold a ton. No. 2 shaft was deepened from 328 feet to 452 feet and a level opened at a depth of 425 feet where high-grade ore was found. Lateral work on the 200, 300, and 425-foot levels amounted to about 3,200 feet. Most of it was done on the 300-foot level where exploratory drift was driven south to explore a group of promising veins that outcrop about 1,400 feet south-southeast of No. 2 shaft. A transmission line was constructed between Negus and Con mines and it is expected that the diesel power will be completely replaced by hydro-electric power during 1941. Negus mine is the first mine in Northwest Territories to pay dividends and the initial payments were made in April, 1941.

Ptarmigan Mines, Limited, controlled by Consolidated Mining and Smelting Company of Canada, Limited, continued work on a single wide quartz vein. The shaft was deepened to 702 feet and a level opened at a depth of 600 feet. Lateral work to date totals more than 3,000 feet and most lateral work during 1940 was done on the 300-, 450-, and 600-foot levels. Ore reserves are not reported but are said to be substantial. A transmission line was built from the mine to the power line from Prosperous Lake to Con mine.

Giant Yellowknife Gold Mines, Limited, did a little diamond drilling and shipped about 51 tons of high-grade gold ore to Trail, B.C., but was idle much of the year. The Company was reported in March, 1941 to have purchased a 25-ton mill.

Beaulieu River Area.—Consolidated Mining and Smelting Company of Canada, Limited, directed operations at the property of Thompson-Lundmark Gold Mines, Limited, after August 31, 1940. All work was done from No. 2 shaft, which was started in 1939 at an incline of about

47 degrees to explore the Fraser Vein. During 1940 the shaft was deepened from 301 feet to 834 feet and levels established 450, 600 and 750 feet (slope distance) from the collar. About 1,800 feet of lateral work was completed, mostly on the 150-, 300- and 450-foot levels. A 150-ton mill for the property was shipped to Yellowknife from the Cordova mine in Ontario. Late in the year work was started on a 35-mile transmission line to the Prosperous Lake power station.

Great Slave Lake.—Operations were resumed in September at the property of Slave Lake Gold Mines, Limited, on Outpost Islands. The two-compartment vertical shaft is 450 feet deep with levels at 50, 125, 200, 325 and 400 feet and lateral work totals about 1,600 feet. Diesel power was installed, a 50-ton mill erected, and the first gold was produced in February, 1941. Most of the gold is recovered by amalgamation and additions to the mill are planned which are expected to recover concentrates containing gold, tungsten and copper. Previous ore reserves of 17,308 tons containing 0.5 ounces of gold a ton, and an unknown amount of tungsten and copper, are said to have been greatly increased.

Snare River Area.—About 2,500 feet of diamond drilling and some surface work was done during the summer by Canbrae Exploration Company, Limited on the Au group about 2 miles north of Slemmon Lake.

Wray Lake Area.—Mercury Gold Mines, Limited, was incorporated to explore strong gold-quartz veins on the Dingo group near Emile River about 120 miles north of Rae. A little surface work was done during the summer. Winter camps were erected and exploration continued during the winter of 1940-41. A steam mining plant for the property reached Rae before freeze-up.

Gold Mining in Yukon, 1940

Twenty-nine quartz grants (lode mining) were issued in the Dawson District during the fiscal year ending March 31st, 1941, and one hundred and sixteen claims were renewed. This is one-half the number held in good standing during the previous year. Activity was confined to representation work.

A total expenditure of \$5,798.28 was made to maintain and improve existing aircraft landing fields. The most important fields, namely, at Dawson, Whitehorse, Mayo and Carcross were extended and improved, and work was also done on the secondary fields at Carmacks and Flat Creek. In addition to the above, the White Pass and Yukon Route constructed, at their own expense, emergency landing fields at Fox Lake, Little Salmon, Yukon Crossing and Grand Valley.

On May 22nd, 1941, the Bureau of Statistics was advised that the Mount Free Gold Mine had been closed down for nearly twelve months and would not be reopened by T. C. Richards. Concentrates containing a relatively small quantity of gold were shipped in 1940 from this property to a smelter in the United States.

Table 41.—Principal Statistics of the Auriferous Quartz Mining Industry in Canada, 1940

	Number of active operators	(c) Number of operating plants or mines	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	(b) Cost of process supplies used	Value of freight paid on shipments of ore, slag, etc.	Smelter and refinery treatment costs	Gross value of bullion, ore, concen- trates or residues shipped from mines (d)	Net value of bullion, ore, concen- trates or residues shipped from mines (a)
1940—			\$		\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	10	10	996,382	386	367,585	64,253	164,912	1,990	7,258	855,673	617,260
Quebec.....	107	110	45,519,219	5,946	9,825,625	1,645,241	3,390,136	73,888	503,277	29,003,738	23,391,196
Ontario.....	114	115	176,714,292	20,299	36,305,677	5,321,666	14,014,319	205,342	1,310,282	122,675,051	101,823,442
Manitoba.....	6	6	3,128,794	600	1,088,840	187,404	368,417	6,107	31,973	2,931,464	2,337,563
Saskatchewan.....	2	2	.....	177	340,955	21,472	240,107	2,614	8,524	773,231	500,514
British Columbia.....	175	181	21,857,974	3,566	6,419,798	673,073	2,220,058	391,077	606,152	20,413,118	16,522,758
Northwest Territories.....	13	13	2,702,499	431	856,616	234,195	353,252	10,631	19,121	2,126,968	1,509,769
Yukon.....	1	1	.....	.....	.....	.....	.....	.....	.....	11,242	.....
Canada.....	428	438	250,919,160	31,405	55,205,096	(c) 8,147,304	20,751,201	691,649	2,486,587	178,790,485	146,713,744

(a) Gross value less cost of fuel, electricity, process supplies, freight and smelting charges.

(b) Explosives, chemicals, etc.

(c) Number of mines producing 278.

(d) Value of bullion produced plus value of ore, concentrates, etc., shipped.

(e) Includes \$6,794,255 in salaries.

Table 42.—Principal Statistics Relating to Producers only in the Auriferous Quartz Mining Industry in Canada, 1940

	Number of producing plants or mines	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	(a) Cost of process supplies used	Value of freight paid on shipments of ore, slag, etc.	(b) Smelter refinery treatment costs	Gross value of bullion, ore, concentrates or residues shipped from mines (d)	Net value of bullion, ore, concentrates or residues shipped from mines (f)
		\$		\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	9	996,157	385	387,485	64,220	164,887	1,990	7,258	855,673	617,318
Quebec.....	27	36,880,589	5,586	9,280,813	1,576,811	3,233,098	73,888	503,277	29,003,738	23,616,664
Ontario.....	76	166,842,210	19,865	35,643,782	5,239,922	13,892,126	205,342	1,310,282	122,675,051	102,057,379
Manitoba.....	5	3,128,794	598	1,086,282	187,404	388,417	6,107	31,973	2,931,464	2,337,563
Saskatchewan.....	2	(c)	177	340,955	21,472	240,107	2,614	8,524	776,824	504,107
British Columbia.....	153	21,176,343	3,447	6,230,057	664,540	2,200,107	391,077	606,152	20,413,118	16,551,242
Northwest Territories.....	5	1,095,248	295	611,554	180,824	322,042	10,631	19,121	2,126,988	1,594,350
Yukon.....	1								11,242	
Total Canada 1940	278	230,719,341	30,353	53,560,998	7,935,193	20,390,784	691,649	2,486,587	178,794,078	147,289,865
Total Canada 1939	232	214,326,089	29,001	50,891,920 (e)	7,701,026	19,001,782	694,165	2,249,312	160,014,172	130,367,887

(a) Explosives, etc.

(b) Includes handling charges.

(c) Not recorded separately—included with data relating to non-ferrous smelting industry in British Columbia.

(d) Value of bullion *produced* plus value of ore, concentrates, etc. *shipped*.

(e) Includes \$5,861,681 in salaries in 1939 and \$6,794,255 in 1940.

(f) Gross value less cost of items shown in columns 1, 2, 3 and 4.

Table 43.—Ores Mined and Milled, Crude Bullion Recovered and Concentrates Shipped in the Auriferous Quartz Mining Industry, 1940

	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	British Columbia	Northwest Territories	Yukon	Canada
Number of producing mines.....	9	27	76	5	2	153	5	1	278
Ore mined..... tons	149,601	4,261,760	12,248,971	258,097	451,658	1,530,303	85,856	.....	18,986,206
Material discarded (sorted)..... tons	11,490	171,920	466,662	2,687	35	99,912	8,842	.....	757,538
Ore milled..... tons	140,748	3,953,703	11,768,174	255,395	451,623	1,430,391	80,186	.....	18,093,439
Tailings retreated..... tons	.....	.....	179,962	.....	.....	349	.....	.....	180,311
Concentrates produced..... tons	245	4,320	35,360	.....	.....	44,554	.....	.....	84,479
Gold content of ores, slags, residues and concentrates shipped—	.....	.....	.....	.....	.....	.....	.....	.....	.....
To foreign smelters..... fine oz.	.....	.....	28,507	.....	.....	152,172	.....	292	180,971
To Canadian smelters..... fine oz.	.....	23,905	2,288	.....	96	25,098	261	.....	51,608
Bullion bars shipped—	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold content..... fine oz.	15,867	725,021	2,784,582	74,759	20,024	332,925	33,033	.....	3,986,211
Silver content..... fine oz.	569	131,233	589,972	11,089	6,158	197,716	17,418	.....	843,135
Bullion produced by amalgamation..... fine oz.	20,302	92,492	402,840	24,063	.....	168,549	17,532	.....	733,678
Bullion produced by cyanidation..... crude oz.	638	864,358	3,602,894	79,238	28,509	277,653	55,832	.....	4,009,142
Total Bullion Produced..... crude oz.	20,940	956,850	4,005,734	103,301	28,509	446,202	73,284	.....	5,634,820
Content of bullion bars produced	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold..... fine oz.	22,219	728,157	3,139,762	76,033	20,024	345,602	54,876	.....	4,386,672
Silver..... fine oz.	645	132,146	593,962	11,327	6,138	101,558	12,923	.....	837,789
Gold value (standard)..... \$	459,297	15,052,341	64,902,557	1,571,745	413,929	7,141,207	1,134,382	.....	90,678,462
Silver value..... \$	241	48,594	205,670	4,187	2,284	37,691	4,468	.....	20,432
Exchange premium on bullion bars produced..... \$	396,135	12,981,703	55,968,176	1,355,528	357,018	6,168,446	978,303	.....	78,205,300
Value of ores, concentrates, slags and residues sold..... \$	.....	920,800	1,597,648	.....	3,593	7,002,774	9,815	11,242	9,605,872
Total Gross Value of Production..... \$	855,673	29,003,738	122,675,051	2,931,461	776,824	20,413,118	2,126,968	11,242	178,791,078
Value of fuel, electricity and process supplies used, also freight on shipments, marketing, smelter and refining charges..... \$	238,413	5,612,542	20,851,609	593,901	272,717	3,890,360	617,199	.....	32,076,741
Net Value of Production..... \$	617,260	23,391,196	101,823,442	2,337,563	500,514	16,522,758	1,509,769	11,242	146,713,744

Table 44.—Ores, Concentrates, Slags, etc., Shipped to Smelters from Canadian Gold Mines, 1929-1940

	To Canadian plants						To Foreign plants					
	Ores		Concentrates		Slags, residues, precipitates		Ores		Concentrates		Slags, residues, precipitates	
	Tons	Gold content fine oz.	Tons	Gold content fine oz.	Tons	Gold content fine oz.	Tons	Gold content fine oz.	Tons	Gold content fine oz.	Tons	Gold content fine oz.
1929.....	27,278	14,327	268	305	1	24	90,871	82,986	2,370	3,638	6	304
1930.....	52,540	22,910	1,187	9,665	2	117	70,497	22,432	18,276	46,102	53	1,009
1931.....	51,579	21,756	3,120	16,805	12	1,505	24,224	11,870	20,271	48,743	47	1,306
1932.....	36,397	17,943	191	952	26	1,416	36,736	15,810	16,925	52,508	30	869
1933.....	30,096	14,882	490	1,349	55	6,279	3,292	2,203	29,111	76,601	34	1,392
1934.....	48,106	29,688	2,490	10,440	203	1,487	1,419	1,936	43,053	114,476	27	599
1935.....	18,239	7,008	7,045	35,958	58	6,231	1,242	2,840	46,050	90,167	25	11,310
1936.....	4,705	6,567	7,865	34,654	64	3,609	1,864	3,421	65,660	137,273	25	16,903
1937.....	37,126	9,649	6,981	21,865	130	2,060	2,516	8,108	62,987	163,781	74	912
1938.....	172,377	36,008	8,404	25,552	37	420	4,445	8,443	40,828	142,513	1,281	23,101
1939.....	271,666	47,114	7,747	24,184	797	4,507	3,853	8,930	39,530	112,126	235	26,631
1940.....	201,941	34,315	4,485	13,532	158	3,761	7,453	8,107	44,370	125,704	103	47,160
Total.....	952,050	262,167	50,273	155,261	1,543	31,416	248,412	177,096	429,631	1,113,632	1,940	131,496

Table 45.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1940

	Ontario mines shipping		Quebec, Saskatchewan, Northwest Territories and Yukon mines shipping		British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
Number of mines.....	17	5	11	1	73	59	166
Tons of ore, etc., shipped.....	162	2,485	181,848	100	24,574	49,541	253,710
Metal content—							
Gold.....oz.	2,288	28,507	24,262	292	25,058	152,172	232,579
Silver.....oz.	19,241	922,941	1,307		272,333	686,397	1,902,209
Copper.....lb.	12,802	436,597	258		2,227	599,162	1,051,046
Lead (a).....lb.		341,426			1,971,234	(a)	2,312,660
Antimony (b).....lb.							
Value—Gross.....\$	93,562	1,504,086	934,208	11,242	1,030,744	6,032,030	9,605,872

(a) Some gold ores exported contain relatively large quantities of lead which are not reported by the producer; this lead is reported by the U.S. Smelters and 50 per cent is credited to Canadian lead production.

(b) Any antimony recovered from Canadian ores in Canadian smelters is not usually reported by mine operators.

Table 46.—Specified Costs per ton of Ore Milled at Certain of the Principal Auriferous Quartz Mines in Canada, 1940

Name of Mine	Development and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
	\$	\$	\$	\$	\$
NOVA SCOTIA					
Seal Harbour Gold Mines Ltd.....	0.2934	1.1645	0.5076	0.4334	2.3989
QUEBEC					
Amm Gold Mines Ltd.....	0.23	1.44	1.02	0.44	3.13
Arnfield Gold Mines Ltd.....	0.333	1.363	0.810	0.610	3.116
Beattie Gold Mines Ltd.....	0.223	0.677	1.015	0.278	2.193
Belletier Quebec Mines Ltd.....	1.878	3.005	1.432	0.780	7.195
Canadian Malartic Gold Mines Ltd.....	0.639	0.894	0.584	0.421	2.538
Central Cadillac Mines Ltd.....	0.98	2.30	1.42	1.16	5.86
Francoeur Gold Mines Ltd.....	0.54	1.30	1.09	1.12	4.05
Lamaque Mining Co. Ltd.....	1.36	2.12	0.69	1.12	5.29
Lapa Cadillac Gold Mines Ltd.....	0.336	1.775	0.969	0.483	3.563
Malartic Gold Fields Ltd.....	1.143	1.587	0.994	1.265	4.989
McWatters Gold Mines Ltd.....	2.01	2.40	1.64	1.00	7.05
O'Brien Gold Mines Ltd.....	2.22	2.50	1.43	1.09	7.24
Pandora Cadillac Gold Mines Ltd.....	1.07	1.24	0.94	0.55	3.80
Perron Gold Mines Ltd.....	2.42	2.76	0.83	0.49	8.50
Powell Rouyn Gold Mines Ltd.....	0.28	2.08	0.82	0.34 (g)	3.52 (d)
Senator-Rouyn Ltd.....	3.56	1.65	2.78	0.51	8.50
Sigma Mines Ltd.....	1.298	2.348	0.615	0.407	4.668
Sisocoe Gold Mines Ltd.....	0.8358	2.0063	0.8369	0.6296	4.3086
Sullivan Consolidated Mines Ltd.....	2.15	1.96	0.98	1.44	6.53
ONTARIO					
Porcupine District					
Broulan Porcupine Mines Ltd.....	0.69	1.40	1.27	1.27	4.63
Buffalo Ankerite Gold Mines Ltd.....	0.614	2.925	0.852	0.615	5.006
Coniaurum Mines Ltd.....	1.82	3.23	0.68	1.00	6.73
De Santis Porcupine Mines Ltd.....	2.06	2.31	1.10	0.63	6.10
Dome Mines Ltd.....	0.869	1.606	1.009	3.359	6.843
Hollinger Consolidated Gold Mines Ltd. (Timmins).....	0.9242	2.6429	0.6000	2.0493	6.2164
Hollinger Consolidated Gold Mines Ltd. (Ross).....	1.9430	1.1499	1.4301	1.3893	5.9123
McIntyre Porcupine Mines Ltd.....	0.634	3.683	0.784	1.867	6.968
Naybob Gold Mines Ltd.....	1.137	2.088	1.026	0.940	5.191
Pamour Porcupine Mines Ltd.....	0.69	1.17	0.53	0.19	2.58
Paymaster Consolidated Mines Ltd.....	1.79	2.53	1.03 (e)	0.47	5.82
Preston East Dome Mines Ltd.....	1.1522	2.2759	0.6889	1.9278	6.0448

Table 46.—Specified Costs per ton of Ore Milled at Certain of the Principal Auriferous Quartz Mines in Canada, 1940—Concluded

Name of Mine	Development and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
	\$	\$	\$	\$	\$
ONTARIO—Concluded					
Kirkland Lake District					
Bidgood Kirkland Gold Mines Ltd.....	3.47	3.91	1.39	0.76	9.53
Golden Gate Mining Co. Ltd.....	2.49	2.84	1.95	1.23	8.51
Kirkland Lake Gold Mining Co. Ltd.....	1.72	3.20	1.22	1.15	7.29
Macassa Mines Ltd.....	1.83	3.05	1.12	3.29	9.29
Morris Kirkland Gold Mines Ltd.....	0.459	2.163	1.368	0.438	4.428
Teck-Hughes Mines Ltd.....	(f)	3.85	0.94	2.72	7.51
Wright-Hargreaves Mines Ltd.....	(f)	4.564	1.120	4.154	9.838
Larder Lake District					
Chesterville Larder Lake Gold Mining Co. Ltd.....	0.381	1.558	0.852	0.367	3.158
Kerr-Addison Gold Mines Ltd.....	1.20	0.89	0.63	0.37	3.09
Omega Gold Mines Ltd.....	0.661	2.391	1.208	0.153	4.413
Matachewan District					
Hollinger Consolidated Gold Mines Ltd. (Young Davidson).....	0.3751	1.4469	0.5997	0.5254	2.9471
Matachewan Consolidated Mines Ltd.....	1.178	1.534	0.786	0.089	3.587
Thunder Bay and Kenora Districts					
Bankfield Consolidated Mines Ltd.....	2.3640	2.8503	1.6580	1.5148	8.3871
Leitch Gold Mines Ltd.....	3.82	7.01	2.17	4.14	17.14
MacLeod-Cockshutt Gold Mines Ltd.....	1.1735	2.1962	1.4400	1.8401	6.6498
Sturgeon River Gold Mines Ltd.....	2.786	7.019	1.809	1.396	13.010
Wendigo Gold Mines Ltd.....	1.33	3.38	1.90	2.58	9.19
Patricia District					
Central Patricia Gold Mines Ltd.....	1.81	2.62	1.25	2.92	8.60
Cochenour Willans Gold Mines Ltd.....	1.739	2.482	2.369	0.774	7.364
McKenzie Red Lake Gold Mines Ltd.....	1.91	2.75	1.11	2.40	8.17
Pickle Crow Gold Mines Ltd.....	0.97	3.11	0.93	0.82	5.83
Uchi Gold Mines Ltd.....	0.46	2.27	0.97	0.87	4.57
MANITOBA					
God's Lake Gold Mines Ltd.....	2.525	2.635	1.528(e)	1.436	8.124
NORTHWEST TERRITORIES					
Con Mine (†).....					(h)
Ryoon Mine (†).....					(h)
Negus Mines Ltd (†).....	4.85	6.32	3.72	6.12	21.01
BRITISH COLUMBIA					
Bayonne Cons. Mines Ltd.....	1.27	5.04	4.21	1.68	12.20
Bralorne Mines Ltd.....	2.0210	2.8810	0.7187	1.9769	7.5976
Cariboo Gold Quartz Mining Co. Ltd.....	2.78	5.09	1.35	2.35	11.57
Gold Belt Mining Co. Ltd.....	1.87	2.98	1.20	0.73	6.78
Hedley Mascot Gold Mines Ltd.....	0.13	2.81	1.48	2.97	7.39
Island Mountain Mines Co. Ltd.....	3.27	2.06	2.09	2.50	9.92
Kootenay Belle Gold Mines Ltd.....	2.73	4.71	1.55	0.75	9.74
Livingstone Mining Co. Ltd.....	7.76	8.89	4.55	6.00	27.20 (d)
Mount Zeballos Gold Mines Ltd.....	2.85	5.02	1.58	3.58	13.03
Osoyoos Mines of Canada Ltd.....	0.02	1.18	1.49	0.50	3.19
Polaris-Taku Mines Co. Ltd.....	1.235	2.718	0.863	1.656	6.472(d)
Reno Gold Mines Ltd., Nelson.....	3.089	1.985	1.890	0.790	7.754
Reno Gold Mines Ltd., Zeballos.....	2.862	3.176	2.647	3.153	11.838
Sheep Creek Gold Mines Ltd.....	1.555	2.867	1.570	1.035	7.027
Ymir Yankee Girl Gold Mines Ltd.....	0.134	2.423	1.264	0.762	4.583

- (a) Exclusive of outside exploration.
 (b) Marketing, head office, taxes, etc.
 (c) Depreciation not included.
 (d) Shipped to smelter.
 (e) Includes crushing and conveying.

- (f) Included under mining.
 (g) Not including taxes.
 (h) Not available for publication.
 (†) New operations in remote district.

Table 47.—Certain Data Relating to the Production of Gold by the Entire Auriferous Quartz Mining Industry in Canada, 1928-1940

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter-refinery treatment on ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1928.....	206	1.47	7.45	Information	Information	.....
1929.....	218	1.46	7.18	not	not	.....
1930.....	237	1.25	6.63	available	available	.....
1931(a).....	250	1.19	6.50	1928	1928	.....
1932.....	255	1.21	6.31	to	to	.....
1933(b).....	207	1.36	7.45	1934	1934	.....
1934(c).....	154	1.71	9.64	.....	.....	.....
1935.....	146	1.89	10.48	4.38	.....	16.75
1936.....	137	1.98	11.32	4.46	.....	17.76
1937.....	132	2.10	12.18	4.65	0.33(d)	19.26
1938.....	150	1.85	10.95	4.53	0.56	17.89
1939.....	157	1.81	10.69	4.45	0.67	17.62
1940.....	161	1.76	10.48	4.49	0.69	17.42

(a) Equalization exchange premiums paid by the Dominion Government to gold miners (Great Britain goes off gold standard).

(b) United States goes off gold standard.

(c) United States gold dollar reduced in weight from 25.8 to 15 5/21 grains, 0.9 fine.

(d) Not including Mint charges and marketing prior to 1938.

NOTE.—The data contained in the foregoing table have been compiled from reports received from both producing and non-producing (exploring and developing) operators in the auriferous quartz mining industry. This fact should be noted if the information is to be construed or employed as possible criteria for technological or other statistical study. The trends revealed are not to be interpreted as entirely reflecting "cause and effect" in the operation of producing mines only but rather as indices of change in the industry as a whole. For data relating to producers only, see following table.

Table 48.—Certain Data Relating to the Production of Gold by Producers Only in the Auriferous Quartz Mining Industry in Canada, 1931, 1939 and 1940

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter-refinery treatment of ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1931.....	256	1.19	6.38	(a)	(a)	.....
1939.....	164	1.76	10.25	4.33	0.67	17.01
1940.....	165	1.72	10.20	4.41	0.69	17.02

(a) Data not available.

Table 49.—Ores Mined and Treated by Auriferous Quartz Mining Industry, 1925-1940

Year	Ore hoisted	Ore milled (c)	Crude ore shipped to smelters (d)	Low grade sorted out	Tailings retreated	Gold recovered as bullion (b)	Gold in crude ore shipped	Gold in concentrates, slag, etc., shipped
	Tons	Tons	Tons	Tons	Tons	Fine oz.	Fine oz.	Fine oz.
1925.....	3,646,460	3,527,021	118,436 †	(a)	48,475	1,482,294	97,011	34,131
1926.....	4,031,035	3,888,041	127,116 †	(a)	48,200	1,517,758	81,849	53,344
1927.....	4,605,190	4,514,389	96,774	(a)	53,155	1,638,149	61,194	64,394
1928.....	4,601,628	4,483,053	113,819	(a)	43,536	1,607,337	72,440	62,543
1929.....	4,354,744	4,252,994	118,149	(a)	48,707	1,669,932	97,323	4,271
1930.....	4,472,803	4,306,869	123,037	(a)	37,095	1,782,556	45,342	56,893
1931.....	5,565,426	5,450,576	75,803	(a)	.....	2,169,293	33,626	68,359
1932.....	6,072,665	5,924,359	73,133	(a)	3,140	2,412,829	33,753	55,745
1933.....	6,528,854	6,446,776	33,388	(a)	3,658	2,352,659	17,085	85,621
1934.....	7,846,854	7,475,278	49,525	(a)	27,235	2,331,822	31,624	127,067
1935.....	8,832,901	8,888,129	19,481	(a)	57,798	2,492,145	9,848	143,666
1936.....	10,694,208	10,504,181	6,569	(a)	33,814	2,903,063	9,988	192,439
1937.....	12,388,489	11,880,323	39,642	457,622	97,710	3,283,795	17,757	188,618
1938.....	14,749,649	14,158,555	176,822	528,696	64,926	3,810,642	44,451	191,586
1939.....	17,105,744	16,150,173	275,519	660,578	18,426	4,160,352	56,044	167,448
1940.....	18,986,306	18,083,439	209,394	757,538	180,311	4,386,673	42,422	190,157

(a) Not available.

(b) Content of bullion shipped 1925-1935; 1936-1940 content of bullion produced.

(c) In addition, a relatively small tonnage of unclassified ores was shipped.

(d) + (d) - total crude ore treated (not including sorted material).

Table 50.—Gold Content of Bullion, Ores, Concentrates, etc., Shipped and Ore Milled by Auriferous Quartz Mines in Canada, with Average Price of Gold in Canadian Funds, 1929-1940

Year	Tonnage treated (*)	Gold content fine oz (†)	Oz. of fine gold per ton	Average price of gold
				\$
1929.....	4,371,143	1,771,526	41	20.67
1930.....	4,429,906	1,884,791	43	20.67
1931.....	5,526,379	2,271,278	41	21.55
1932.....	5,997,492	2,502,327	42	23.47
1933.....	6,480,164	2,455,365	38	28.60
1934.....	7,524,803	2,490,513	33	34.50
1935.....	8,907,610	2,645,659	30	35.19
1936.....	10,510,750	3,095,427	29	35.03
1937.....	(a) 11,919,965	3,490,170	29	34.99
1938.....	(a) 14,335,377	4,046,679	28	35.17
1939.....	(a) 16,425,692	4,383,844	27	36.14
1940.....	(a) 18,292,833	4,619,252	25	38.50

(*) Does not include tailings retreated, but includes ore milled plus crude ore shipped to smelters.

(†) Relatively small quantity of gold contained in concentrates, slags, etc., shipped may have originated in ores treated during the previous year; from 1937 represents metal content of total bullion produced plus metal in ores or concentrates shipped to smelters.

(a) Material discarded by sorting not included.

Table 51.—Milling Capacity of Producing Canadian Gold Mines, 1935-1940 (Tons of 2,000 pounds per 24 hours)

	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	British Columbia
1935.....	292	3,368	20,921	1,465	.....	2,990
1936.....	713	4,514	22,639	1,000	.....	4,120
1937.....	565	6,090	25,249	975	30	3,915
1938.....	542	8,217	30,097	875	1,000	4,590
1939.....	562	9,580	33,324	865	1,000	4,417
1940.....	450	11,215	35,030	690	1,200	4,255

Table 52.—Principal Statistics Relative to all Ontario Gold Mines by Areas*, 1940

Camp or District	Number of producers	Ore † treated	Total gold recovered	Average ounces per ton recovered	Employees	Salaries and wages paid	Cost of fuel, electricity and process supplies
		Tons	Fine oz.		No.	\$	\$
1940							
Porcupine.....	21	5,647,114	1,426,173	-25	9,107	16,101,444	8,021,747
Kirkland Lake.....	11	(a) 2,150,762	875,982	-41	4,719	8,665,327	4,072,510
Larder Lake.....	3	839,275	148,106	-18	872	1,589,845	1,403,020
Matachewan.....	2	550,280	60,501	-11	510	915,210	638,670
Sudbury.....	2	118,450	21,485	-18	290	505,040	197,197
Algoma.....	2	83,564	16,111	-19	205	308,748	151,042
Thunder Bay.....	12	825,012	266,946	-32	1,930	3,523,002	1,953,185
Rainy River and Kenora.....	8	50,113	14,970	-30	202	272,592	102,454
Patricia.....	14	(b) 1,477,078	337,175	-23	2,399	4,347,949	2,763,687
Eastern Ontario.....	1	26,526	3,108	-12	65	76,520	32,473
Total.....	76	11,768,174	3,170,557	-27	20,299	36,305,677	19,335,955

* Includes data for all active properties.

† Does not include low-grade discarded by sorting or tailings retreated, but includes ore milled or smelted.

(a) In addition 143,168 tons tailings were retreated.

(b) In addition 36,794 tons tailings were retreated.

Table 53.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1940

Province	Mines		Capital employed as represented by:					
			Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	10	9	444,632	492,404	39,197	552	19,597	996,382
Quebec.....	110	27	17,450,974	16,737,751	2,900,970	925,318	7,504,206	45,519,219
Ontario.....	115	76	40,242,783	81,888,942	9,856,292	3,533,919	41,192,356	176,714,292
Manitoba.....	6	5	7,206	1,508,128	481,849	.....	1,131,611	3,128,794
Saskatchewan.....	2	2	(a)	(a)	(a)	(a)	(a)	(a)
British Columbia..	181	153	3,748,105	6,972,806	1,579,349	805,480	8,752,234	21,857,974
Yukon.....	1	1	†	†	†	†	†	†
Northwest Territories (b).....	13	5	1,519,201	559,094	365,879	.....	258,325	2,702,499
Total.....	438	278	63,412,901	108,159,125	15,223,536	5,265,269	58,858,329	250,919,160

(a) Not available; included with non-ferrous smelting industry in British Columbia.

† Not available.

(b) Capital of one producing mine included with non-ferrous smelting industries in British Columbia.

Table 54.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada, by Provinces, 1940

Province	Number of employees					Salaries and wages
	On salary	Wage-earners			Total employees	
		Surface	Under-ground	Mill		
						\$
Nova Scotia.....	58	97	203	28	386	367,585
Quebec.....	624	1,574	3,315	433	5,946	9,825,625
Ontario.....	1,427	4,812	12,634	1,426	20,299	36,305,677
Manitoba.....	64	202	297	37	600	1,088,840
Saskatchewan.....	38	37	76	26	177	340,955
British Columbia (b).....	366	750	2,082	368	3,566	6,419,798
Northwest Territories.....	81	176	153	21	431	856,616
Yukon.....	(a)	(a)	(a)	(a)	(a)	(a)
Canada.....	2,658	7,648	18,760	2,339	31,405	55,205,096

(a) Data not available.

(b) In B.C. there are included with mill employees 35 men working in a mill underground. This is the only underground mill reported in Canada.

Table 55.—Wage-Earners, by Months, in the Auriferous Quartz Mining Industry, 1940

Month	Surface	Under-ground	Mill	Total
January.....	7,080	18,465	2,278	27,823
February.....	7,269	18,451	2,292	28,012
March.....	7,297	18,660	2,313	28,270
April.....	7,374	18,622	2,299	28,295
May.....	7,792	18,714	2,358	28,864
June.....	7,900	18,268	2,360	28,528
July.....	7,819	18,536	2,386	28,741
August.....	7,941	18,639	2,375	28,955
September.....	8,223	19,015	2,388	29,626
October.....	8,247	19,437	2,422	30,106
November.....	8,141	19,586	2,426	30,153
December.....	7,734	19,266	2,380	29,380

THE COPPER-GOLD-SILVER MINING INDUSTRY

The mining of "copper-gold-silver" ores in Canada during 1940 was confined to the provinces of Quebec, Manitoba, Saskatchewan and British Columbia. It is to be noted that in addition to the copper recovered from ores of this type there is a very large and increasing quantity of the metal obtained in the smelting and refining of the copper-nickel ores mined in the Sudbury area of Ontario; increasing quantities of gold and silver are also being extracted from these copper-nickel ores.

Mining operations conducted on Canadian copper-gold-silver deposits during 1940 were reported by 25 firms compared with 28 in 1939. The gross value of crude ore, concentrates, etc., shipped in 1940 from the mines and mills to smelters was estimated at \$51,174,776; the cost of fuel, purchased electricity, process supplies, freight and smelter treatment totalled \$25,370,357 and the net value of shipments was estimated at \$25,804,419.

During the year under review the industry provided employment for 6,115 persons and distributed \$10,777,827 in salaries and wages.

The statistics as herein shown under the copper-gold-silver mining industry refer only to mines and mills and are not inclusive of data pertaining to the operation of smelters and refineries. Statistics relating to the reduction of non-ferrous ores are recorded under the non-ferrous smelting and refining industry.

Quebec.—Noranda Mines Ltd. reported that in 1940 a total of 9,313 feet of drifting, 6,844 feet of raising and 84,443 feet of exploratory diamond drilling was done at the Horne mine. The use of diamond drills instead of percussion rock drills for drilling holes used in blasting down ore in stopes has gradually increased until now over one-half of the ore broken at the Horne mine is mined by this method.

A large body of rhyolite-breccia, in which occurs numerous large and small lenses of massive pyrite, has been found to extend from the 1,500 foot level to a depth of at least 1,000 feet below the 3,975 foot level.

Waite Amulet Mines Ltd. completed 119,460 feet of diamond drill stope holes in the Amulet section and at the end of 1940 the tonnage drilled and ready for blasting was 360,000 tons. The ore reserve estimate of December 31, 1940 was as follows: Amulet (other than lower "A" ore-body) 270,000 tons averaging copper, 2·7 per cent; zinc, 10 per cent; gold, ·05 ounces per ton and silver 2·5 ounces per ton. Lower "A" orebody 3,260,000 tons; copper, 6·3 per cent; zinc 5·1 per cent; gold ·05 ounces per ton and silver 1·6 ounces per ton. It was expected that production of zinc concentrates would commence in April, 1941. Ore reserves in the Amulet section as of December 31, 1940 were estimated as follows: Copper ore, 312,000 tons; copper, 3·4 per cent; gold, ·03 ounces per ton, and silver, ·3 ounces per ton; zinc ore, 300,000 tons zinc 11·52 per cent.

Normetal Mining Corp. Ltd. confined stoping operations in 1940 to No. 1 and 2 orebodies. Of the total ore broken about 46·5 per cent was in cut-and-fill stopes, 34·9 per cent in shrinkage

stopes, and 18.6 per cent in development. Copper concentrates were shipped throughout the year to Noranda Smelter. Of the resultant copper, approximately 80 per cent was sold, under contract, to the British Ministry of Supply and the balance for domestic consumption. Zinc concentrates stock piled, as well as current production, were shipped to a smelter in the United States.

The mine and mill of the Aldermac Copper Corporation Limited, located in Beauchastel Township, were in operation throughout the year. Ore raised in 1940 totalled 353,072 tons and the quantity milled amounted to 353,652 tons. Copper concentrates were shipped chiefly to the Noranda smelter while the iron pyrites output went to various plants located in Canada and the United States.

Manitoba.—Sherritt Gordon Mines Ltd. brought its East mine into production in May and continued in production until the end of November. Operations in the West mine continued throughout the year on the basis of a six day week. Approximately 73 per cent of all underground development work and 83 per cent of the underground diamond drilling was done in the West mine. Costs and development work in 1940 about equalled those of 1939, and although tons milled during 1940 were practically the same as in 1939, ore reserves as at December 31, 1940 are substantially equal to those of December 31, 1939. The net operating cost in 1940 was reported at \$2.032 per ton milled or 4.128 cents per pound of copper; the net cost of electrolytic copper, f.o.b. refinery, was recorded at 7.226 cents per pound.

The Hudson Bay Mining and Smelting Co. Limited reported that approximately 86 per cent of the ore milled at the Flin Flon mine during 1940 was derived from underground mining operations and 14 per cent from the open pit. Production of gold, silver, copper and zinc from Flin Flon materials was the highest for any year in the history of the Company. The tonnage of ore treated in the concentrator was gradually increased during the year 1940. The average percentages of recovery of gold, silver and copper in copper concentrates were each the highest on record. The percentage of recovery of the zinc in the zinc concentrates was somewhat lower than in 1939. There was a slightly lower tonnage of zinc concentrates treated in the zinc plant but due to a somewhat greater zinc content and a better recovery in the zinc plant itself, the slab zinc production was higher than in any previous year. The additions to the zinc plant in 1940 included two new roasters, two additional thickeners, more purification equipment and solution storage tanks in the zinc leaching plant; the installation of the fifth electrolytic tank circuit and the completion of a new fifty-ton melting furnace in the casting plant. The cadmium plant operated continuously throughout the year and copper smelting operations were satisfactory. Another record tonnage of pay charge of Hudson Bay materials and custom concentrates was treated in the smelter.

British Columbia.—The Howe Sound Company reported that the Britannia property operated continuously in 1940. Due to war effort and the movement of men into other industries, a shortage of skilled labour developed and on November 1 it became necessary to decrease the scale of operations in order to divert sufficient personnel to carry on essential exploratory work. This work was largely concentrated between the 2,700- and 4,100-foot levels, although some diamond drilling gave information at greater depths. The mineralized zone on the horizon of the 4,100-foot level was outlined above the tunnel and partially developed by drilling to a depth of over 300 feet below it. This work has proved the existence of a commercial orebody of importance and further exploration of the area will be continued in 1941. The result of the exploratory work has been encouraging.

The "Miner", Vancouver, reports that development at the Copper Mountain mine of the Granby Consolidated Mining, Smelting & Power Co. Ltd. during 1940 consisted of 9,376 feet of drifting and crosscutting, 15,847 feet of raising and 37,504 feet of diamond drilling. A total of 3,748,447 tons of ore were added to the reserves during the year. Ore shipments during the year amounted to 1,650,486 tons; this leaves a net addition to the reserves of shipping ore of 2,097,961 tons after making provision for losses resulting from non-recoverable pillars and possible excessive dilution. At the Allenby Concentrator, the enlargement programme, undertaken early in the year, was completed about the end of September. An appreciable improvement was made in the recovery of gold and silver, but a slight decrease in the recovery of copper occurred during the year.

Table 56.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1940 (a)

Province	Mines		Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
			\$	\$	\$	\$	\$	\$
Quebec.....	13	6	1,462,967	9,116,491	1,492,360	518,284	6,430,289	19,020,391
Manitoba.....	2	2	4,470,621	7,301,426	1,132,211	848,545	8,683,862	22,436,665
Saskatchewan.....	1	1	2,103,822	2,685,771	410,408	40,208	3,417,026	8,657,235
British Columbia*	10	8	292,240	3,463,782	823,118	116,677	5,636,840	10,332,657
Total.....	26	17	8,329,650	22,567,470	3,858,097	1,523,714	24,168,017	60,446,948

* Reports from small leasers shipping from deposits of the Cons. M. & S. Co. of Can. Ltd., in the Rossland district, are compiled as one producer; statistics relating to employment, etc., at these properties are not available.

(a) Not including smelters and refineries.

Table 57.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, by Provinces, 1940*

Province	Number of employees					Salaries and wages
	On salary	Wage-earners			Total em- ployees	
		Surface	Under ground	Mill		
						\$
Quebec.....	92	484	1,386	205	2,167	3,698,211
Manitoba.....	155	576	634	137	1,502	2,869,446
Saskatchewan.....	59	207	154	49	469	881,786
British Columbia.....	186	506	937	348	1,977	3,328,384
Canada.....	492	1,773	3,111	739	6,115	10,777,827

* Not including smelters and refineries.

Table 58.—Wage-Earners, by Months, in the Copper-Gold-Silver Mining Industry in Canada, 1940*

Month	Surface	Under-ground	Mill	Total
January.....	1,726	3,239	716	5,681
February.....	1,705	3,220	714	5,639
March.....	1,696	3,121	720	5,537
April.....	1,755	3,110	751	5,616
May.....	1,830	3,154	758	5,742
June.....	1,906	3,130	772	5,808
July.....	1,904	3,124	797	5,825
August.....	1,790	3,095	748	5,633
September.....	1,810	3,059	736	5,605
October.....	1,752	3,061	723	5,536
November.....	1,710	3,041	709	5,460
December.....	1,682	2,961	712	5,355
Average.....	1,773	3,111	739	5,623

* Smelter employees not included.

Table 59.—Shipments from Copper-Gold-Silver Mines of Canada, 1940

	Quantity	Value	Total metal content as determined by settlement assay—				
			Gold	Silver	Copper	Sulphur	Zinc
1940	tons	\$	fine oz.	fine oz.	pounds	tons	pounds
12 mines shipped to Canadian plants (b)—							
Ores.....	860,237	9,647,143	156,857	372,408	35,648,576		
† Copper concentrates.....	768,833	27,351,049	258,692	3,514,614	188,421,117		(c) 2,492,666
Zinc concentrates.....	108,328	2,847,070	5,250	185,406	954,803		102,169,600
Iron pyrites concentrates.....	36,308	76,218				17,619	
Slags, residues and gold precipitates.....	563	935,461	23,739	120,970	530,712		
9 mines shipped to foreign plants—							
Ores.....	11	984	11	949	2,234		
Copper concentrates (g).....	159,316	9,178,719	39,952	492,352	78,778,442		
Zinc concentrates.....	30,389	530,018	456	45,552	444,808		32,558,961
Iron pyrites concentrates.....	91,457	608,117				147,432	
Total (f).....	2,055,445	51,174,776	484,957	4,732,251	304,780,692	165,051	137,221,227
Value of process supplies, etc. (e).....		25,370,357					
Net Value.....		25,804,419					

(†) Includes some cyanide precipitate and slags.

(b) Certain mines operated in the Rossland area by leasers are treated, statistically, as one mine.

(c) Not necessarily all recovered.

(e) Includes freight on ore shipments, smelter charges and fuel and purchased electricity.

(f) Gross value.

(g) One producer reported only net metal content of shipments.

Table 60.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1940

	Manitoba and Saskatchewan	Quebec	British Columbia	Canada
	tons	tons	tons	tons
Ore mined.....	2,478,617	2,611,552	3,841,122	8,931,291
Ore milled.....	2,480,220	2,014,506	3,831,253	8,325,979
Copper concentrates produced.....	436,085	334,797	159,740	930,622
Copper precipitates produced.....			669	669
Pyrite concentrates produced.....		114,942	57,558	172,500
Zinc concentrates produced.....	108,421	17,925		126,346

NOTE.—In addition some cyanide precipitate is produced in the recovery of gold from copper-gold ores; this is smelted in the production of blister or anode copper; also the Manitoba-Saskatchewan boundary passes through the Flin Flon mine.

CHAPTER III

THE SILVER MINING INDUSTRY IN CANADA

(a) The Silver-Cobalt Mining Industry; (b) the Silver-Lead-Zinc Mining Industry.

Definition of the Industry.—Silver Mining in Canada is not a distinct mining industry in as much as silver or silver-bearing minerals usually occur in association with other metals of economic value—with lead and zinc; with cobalt, nickel and arsenic; with lode and placer free gold; in copper-gold and nickel-copper ores, and at Great Bear Lake, Northwest Territories with uranium and radium. Silver-lead-zinc mining is a very important industry in British Columbia and, to a lesser extent, in the Yukon Territory. In Eastern Canada, ores containing lead and zinc have been mined in Ontario, Quebec and Nova Scotia.

It is to be noted that, in addition to its recovery from silver-lead ores, zinc is now produced in large quantities from the copper-gold-silver ores of the Flin Flon mine, a property located on the Manitoba-Saskatchewan boundary. Zinc concentrates have been produced in British Columbia from copper-gold-silver ores by the Britannia Mining and Smelting Co. Ltd.; the metal also occurs with copper-gold-silver ores in Quebec and commercial shipments of zinc concentrates made from these particular ores have been made yearly since 1937.

Statistical data contained in this chapter are essentially those pertaining to the mining of silver-cobalt and silver-lead-zinc ores and, to a lesser extent, silver-pitchblende ores.

(a) The Silver-Cobalt Mining Industry

The mining of silver-cobalt ores in Canada has been confined almost entirely to the district of Temiskaming in Northern Ontario. Veins containing these metals were discovered at or near the present town of Cobalt in 1903 and shipments of ores from this area have been continuous since 1904. Depletion and exhaustion of ore reserves during recent years have resulted in a relatively great decline in the production of metals from these deposits. In most instances, operations at properties, some of which were prominent as producers in the past, were conducted during recent years by lessees and shipments ranged from one to several hundred tons. The increased demand for cobalt as an alloying metal has, for some years, stimulated operations of a salvage nature at several of the older mines.

The gross value of shipments made by silver-cobalt mines in 1940 totalled \$866,610 and the net value of sales was estimated at \$809,263. The number of shippers was reported at 48 and the quantity of ore mined amounted to 43,245 tons. The O'Brien mine at Cobalt was operated under lease in 1940 while operations again, chiefly of a salvage nature, were stimulated throughout the camp by the increased demand for cobalt as an important war-time material.

Table 61.—Statistics of the Silver-Cobalt Mines and Mill Operations in Canada, 1940

	1940
Number of mines in operation (*).....	44
Ore mined.....	43,245
Ore treated (milled) (a).....	49,982
Tailings treated.....	10,577
Concentrates produced.....	1,627
Gross value of bullion, ore, concentrates and residues sold.....	\$ 866,610
Cost of freight.....	3,127
Smelter charges.....	15,484
Cost of fuel and purchased electricity used.....	10,900
Cost of process supplies used.....	27,836
Net value of sales.....	\$ 809,263

(*) All mines located in Northern Ontario and includes properties on which the operations consisted only in salvaging ore from dumps, etc.

(a) Does not include crude ore shipped.

Table 62.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1940

	\$
Present cash value of the land (excluding minerals).....	4,441
Present value of buildings, fixtures, machinery, tools and other equipment.....	59,146
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	27,014
Inventory value of finished products on hand.....	246,479
Operating capital (cash, bills and accounts, receivable, prepaid expenses, etc.).....	337,080
Total	

Table 63.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1940

	Number	Salaries and wages
		\$
SALARIED EMPLOYEES—		
Total.....	18	40,970
WAGE-EARNERS—		
Surface.....	40	117,054
Underground.....	48	
Mill.....	17	
Total.....	105	117,054
Grand total	123	158,024

Table 64.—Number of Wage-Earners on Payroll or Time Record on the 15th of Each Month, or Nearest Representative Date, in the Silver-Cobalt Mining Industry, 1926 and 1940

Month	1926	1940			Total 1940
		Mine		Mill	
		Surface	Under- ground		
January.....	1,496	24	38	1	63
February.....	1,456	25	35	12	72
March.....	1,501	27	40	12	79
April.....	1,478	33	40	11	84
May.....	1,480	45	49	28	122
June.....	1,490	52	58	28	138
July.....	1,501	58	60	26	144
August.....	1,533	47	60	26	133
September.....	1,592	45	59	24	128
October.....	1,560	43	57	27	127
November.....	1,478	36	46	6	88
December.....	1,426	27	42	5	74

(b) The Silver-Lead-Zinc Mining Industry

In 1940 the silver-lead-zinc mining industry of Canada reported 82 operators or firms as being actively engaged in the mining, prospecting or development of silver-lead-zinc deposits and of these operators 72 reported commercial shipments during the year under review.

Nova Scotia.—Production of silver-lead-zinc ores in Nova Scotia in 1940 represented only shipments of zinc concentrates made from stock accumulated at the Stirling mine during previous mining operations. The Stirling mine is now inactive and milling ceased February 13th, 1938.

Quebec.—In Lemieux Township, Gaspé County, considerable prospecting of lead-zinc deposits in 1940 was reported by the Federal Zinc and Lead Co. Ltd.; no shipments of ores were reported from these operations. During the year under review, only pumping and ordinary maintenance operations were conducted at the Tetreault mine, located at Montauban les Mines.

In the township of Grand Calumet, work was suspended in March, 1940 by Calumet Mines Ltd.; operations during the early months of the year included 1,421 feet of diamond drilling. Zinc concentrates were produced in Northwestern Quebec in 1940 from the copper-gold-silver ores of the Normetal mine; these were exported to the United States.

Ontario.—The only company reporting silver-lead-zinc mining operations in Ontario in 1940 was the Lennox Mines Co. Ltd.; this Company carried on surface work in January and February, but no commercial ore shipments were made. The property is located in the township of Sheffield, county of Lennox-Addington.

British Columbia.—British Columbia is the most important producer of silver-lead-zinc ores in the Dominion. The gross value of shipments of these ores during 1940 amounted to \$19,867,669 and the net value of same was estimated at \$15,976,502. The industry in British Columbia provided employment to 1,433 persons and distributed \$2,632,983 in salaries and wages.

The Consolidated Mining & Smelting Company of Canada Ltd. is the largest single producer of silver-lead-zinc ores in Canada. The production of this Company comes from the Sullivan mine located at Kimberley. The Company reported that ore development in 1940 was kept ahead of production; mining costs for the year were a little higher than in 1939; milling costs, however, were lower, the result being that the cost of mining and milling in 1940 was exactly the same as in 1939. The grade of ore extracted was slightly higher than in the previous year.

Base Metals Mining Corp. Ltd. reported that milling was recommenced at the Monarch mine on January 15th, 1940, and the concentrator operated at full capacity throughout the year. Shipments of concentrates started on January 22nd, 1940 and have been going forward steadily since then. Excellent recoveries and grades of concentrates have been obtained. During the year, the major amount of ore mined was in the East Monarch.

In the Greenwood Mining Division, mining operations were conducted continuously throughout the year by Highland-Bell Ltd. Crude ore is shipped by this Company to the Trail smelter. At Silverton, milling operations commenced at the Standard mine by the Western Exploration Co. Ltd. on September 11th; both lead and zinc concentrates were produced for export. In addition to these larger operations, several other properties reported relatively smaller shipments and considerable work was conducted under lease.

Yukon.—In Yukon the Mastiff mine was operated by Settlementier and Bermingham from February to June. Crude silver-lead ore from this property was exported to the United States. At Galena Hill in the Mayo district, mining operations were conducted throughout the year by the Treadwell Yukon Corp. Ltd.; milling was carried on from April 15th to September 15th; both crude silver-lead ore and silver-lead concentrates were shipped to a smelter in the United States.

Northwest Territories.—Eldorado Gold Mines Ltd. operated its pitchblende-silver property at Great Bear Lake from January 1st to June 18th, then closed down. Pitchblende concentrates were shipped to the Company's radium refinery located at Port Hope, Ontario and silver concentrates were consigned to Tacoma, Wash.

Table 65.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry* in Canada, 1940

	Yukon and Northwest Territories	British Columbia (b)	Canada
	Tons	Tons	Tons
Ore mined.....	40,424	2,600,049	(a) 2,640,973
Ore milled.....	39,104	2,588,458	2,627,562
Concentrates produced—Lead.....	2,538	333,537	336,075
Zinc.....		297,811	297,811
Pitchblende-silver.....	407		407
Silver and silver-copper.....	11		11

* Includes silver-pitchblende ore mined in Northwest Territories.

(a) Includes 500 tons mined in Ontario.

(b) No ores mined or milled in Quebec or Nova Scotia in 1940.

Table 66.—Destination of Shipments from Silver-Lead-Zinc Mines of Canada, 1940

	Tons Shipped	Value at shipping point	Total metal content as determined by settlement assay			
			Gold fine oz.	Silver fine oz.	Lead pounds	Zinc pounds
		\$				
To Canadian smelters—						
Lead ore.....	9,290	398,035	561	1,156,505	867,234	153,327
Lead concentrates (a).....	311,357	11,897,114	47	8,237,836	436,571,990	24,040,827
Zinc concentrates (*).....	285,206	5,523,355	38	622,260	20,754,187	285,651,113
Dry ore.....	1,784	43,006	430	85,440	50,042	18,515
Total.....	607,637	17,861,510	1,076	10,102,041	458,243,453	309,863,782
To Foreign smelters—						
Lead ore.....	139	15,663	3	38,192	193,193	.....
Lead concentrates.....	11,719	1,366,041	263	2,316,335	1,663,206	521,944
Silver concentrates (b).....	5	7,299	.....	19,600	.....	.....
Zinc concentrates (*).....	24,833	1,569,585	.....	59,427	586,929	27,607,715
Dry ore.....	.....	.....	.....	.....	.....	.....
Total.....	36,696	2,958,588	266	2,433,584	2,443,328	28,129,659
Grand Total (gross).....	644,333	20,820,098	1,342	12,535,625	460,686,781	337,993,441
Cost of freight.....	.....	1,455,311	.....	.....	.....	.....
Cost of fuel and purchased electricity.....	.....	468,157	.....	.....	.....	.....
Smelter charges.....	.....	1,657,811	.....	.....	.....	.....
Cost of process supplies.....	.....	799,285	.....	.....	.....	.....
Net Value.....	.....	16,439,530	.....	.....	.....	.....

(*) Does not include any zinc concentrates produced from copper-gold-zinc ores in Quebec, Manitoba, Saskatchewan or British Columbia (includes 28 tons crude ore to Canadian smelters).

(a) Includes shipments of silver-pitchblende concentrates from Northwest Territories. Information relating to content of pitchblende is not available for publication.

(b) Recovered from pitchblende silver ores; in 1940 they contained 424,372 pounds of copper.

NOTE.—In addition to the metals contained in shipments listed in this table there are important quantities of lead and silver contained in ores shipped from certain gold mines in British Columbia. Cadmium, bismuth, antimony and sulphur are also recovered from these ores (silver-lead-zinc).

Table 67.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1940

Province	Present, cash value of land, excluding minerals	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$	\$
Ontario, Quebec, Yukon and N.W.T.*.....	180,959	641,696	349,908	2,828	673,629	1,849,020
British Columbia.....	7,069,878	9,113,171	1,442,669	75,320	419,140	18,120,178
Canada.....	7,250,837	9,754,867	1,792,577	78,148	1,092,769	19,969,198

* Includes data relating to silver and silver-pitchblende mines in the Northwest Territories. No capital data reported for Nova Scotia.

Table 68.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1940

Province	On salary	Mine		Mill	Total	Salaries and wages
		Surface	Under-ground			
British Columbia.....	212	256	666	299	1,433	\$ 2,632,983
Ontario, Quebec, Yukon and N.W.T.†.....	32	50	60	10	152	419,549
Canada.....	244	306	726	309	1,585	3,052,532

† Includes data on silver-pitchblende mining operations in the Northwest Territories; no mining operations were conducted in Nova Scotia.

Table 69.—Number of Wage-Earners, by Months, in the Silver-Lead-Zinc Mining Industry, 1940

Month	Mine		Mill	Total
	Surface	Under-ground		
January.....	256	685	281	1,222
February.....	264	682	284	1,230
March.....	255	689	284	1,228
April.....	290	713	290	1,302
May.....	333	793	349	1,475
June.....	316	749	299	1,364
July.....	316	773	308	1,397
August.....	320	777	326	1,423
September.....	316	750	324	1,390
October.....	314	733	317	1,364
November.....	332	697	326	1,355
December.....	317	712	330	1,359
Average.....	306	726	309	1,341

ARSENIC

Production of arsenic in Canada during 1940 totalled 2,093,275 pounds valued at \$62,798 compared with 1,741,917 pounds at \$52,257 in the preceding year. During recent years refined arsenic has been produced only by the Deloro Smelting and Refining Company Limited in its plant located at Deloro, Ont. Until 1940 it was recovered by this Company entirely in the treatment of silver-cobalt ores mined in Northern Ontario. Production figures as published represent the element in the form of arsenious acid or white arsenic.

Commercial production of new arsenic in all forms from Canadian ores since 1885 to the end of 1940 amounted to 68,340 short tons valued at \$6,591,659. The largest annual output occurred in 1918 in which year 3,560 short tons worth \$563,639 were recorded. Arsenic is often a constituent of gold ores and has been commercially recovered from auriferous ores mined in Nova Scotia, Ontario and British Columbia. Arsenical gold ores are now being treated at mines located in Northwestern Quebec and in the Thunder Bay District of Ontario. During 1940 Beattie Gold Mines Ltd., Duparquet, Quebec, produced 2,520 short tons of crude arsenic (As_2O_3) and the O'Brien Gold Mines Ltd., Cadillac township, Quebec, 371 short tons of crude arsenic. No commercial shipments of arsenic were reported by either Company during the year under review; however, a shipment of crude arsenic was made in 1940 for experimental purposes by O'Brien Gold Mines Ltd.; this was consigned to the Deloro smelter, Deloro, Ontario.

Table 70.—Production of Arsenic in Canada, 1931-1940

Year	Arsenic in ore exported		White arsenic		Year	Arsenic in ore exported		White arsenic†	
	tons	\$	tons	\$		tons	\$	tons	\$
1931.....			1,787	135,170	1936.....			683	42,491
1932.....			1,212	98,714	1937.....			695	41,032
1933.....			734	56,534	1938.....			1,087	56,538
1934.....			824	56,412	1939*			871	52,257
1935.....			1,279	75,326	1940.....			1,047	62,798

* In addition crude arsenic was recovered at certain mines during 1939 in the treatment of Quebec and Ontario gold ores but no commercial shipments were reported.

† 1931-1940 recovered at the Deloro smelter from Ontario silver-cobalt ores only; in 1940 arsenic recovered at Deloro, Ontario, from auriferous quartz ores mined in the Province of Quebec was stock piled for commercial shipment in 1941.

COBALT

Cobalt.—The Canadian output of cobalt comes entirely from the silver-cobalt deposits of northern Ontario and includes cobalt recovered and sold in the metallic state, the cobalt content of oxides and salts made and sold and the metal content of cobaltiferous ores exported. Canadian production in 1940 totalled 794,359 pounds valued at \$1,235,220.

There is at present only one smelter in Canada treating cobalt ores; this is the plant of the Deloro Smelting and Refining Company, Limited, located at Deloro, Ontario. This Company produced mixed nickel and cobalt oxides at Deloro for the first time in 1910. Continuous operations were conducted by the Company throughout 1940 and production included cobalt metal, cobalt salts, cobalt oxide, arsenic and silver bullion. It is also interesting to note that in 1939, for the first time, cobalt residues were received by the Deloro Smelting and Refining Company, Limited, from Africa. These residues are now treated by the Company for the recovery of the

cobalt content. Since 1904, the first year for which cobalt production was recorded in Canada, there were produced, to the end of 1940, in all forms, 33,858,014 pounds valued at \$33,157,056. The outbreak of war in Europe in 1939 was reflected in both an increased demand and price for cobalt.

As a result of the extensive research, the use of cobalt continues to expand, consequently world production has increased greatly. Cobalt oxide is used in the ceramic industry; cobalt salts in the preparation of driers for use in paints, varnishes, and linoleums and as a catalyst; and cobalt metal in various types of high-grade steels (especially metal cutting and magnet steels), as a catalyst, and in electroplating.

Metal and Mineral Markets—New York, reported prices as follows: July 1941—Cobalt metal, 97 to 99 per cent \$2.11 per pound for small lots, spot; on lots of 100 pounds or more \$1.50. Cobalt ore, New York, May, 1941—per pound of cobalt: 8 to 9 per cent grade 80 cents; 9 to 10 per cent, 90 cents; 10 to 11 per cent, 90 to 95 cents; 11 to 12 per cent, 95 cents to \$1.00; 12 to 13 per cent, \$1.00 to \$1.05; carload lots f.o.b. Ontario—prices nominal.

The Deloro Smelting and Refining Co. Ltd., is the only Canadian firm producing cobalt alloys or cobalt metal; cobalt alloys are sold by this company almost entirely for use as cutting tools and hard facing material.

Table 71.—Production of Cobalt* in Canada, 1931-1940

Year	Pounds	Year	Pounds
1931.....	521,051	1936.....	887,591
1932.....	490,631	1937.....	507,064
1933.....	466,702	1938.....	459,226
1934.....	534,671	1939.....	732,561
1935.....	681,419	1940.....	794,359

* Includes metal produced in Canada, metal in salts and oxides produced and metal in ores exported.

Table 72.—Cobalt Salts used in the Manufacture of Canadian Pigments and Paints, 1933-1940

Year	Pounds	\$	Year	Pounds	\$
1933.....	10,885	7,463	1937.....	37,258	17,062
1934.....	26,300	14,069	1938.....	43,703	17,993
1935.....	110,419	33,292	1939.....	52,979	21,638
1936.....	170,932	43,230	1940.....	89,332	28,111

SILVER

Production of newly mined silver in Canada in 1940 totalled 23,833,752 fine ounces valued at \$9,116,172 compared with 23,163,629 fine ounces at \$9,378,490 in 1939. The average price of the metal in Canadian funds was 38.249 cents per fine ounce in 1940 as against 40.488 cents in 1939. The greatest annual production of silver in Canada was in 1910 in which year an output of 32,869,264 fine ounces was recorded; the highest average yearly price per fine ounce for the metal in Canada was 111.122 cents in 1919. Production of silver in Canada since 1887, the first year for which data are available, to the close of 1940 totalled 807,498,741 fine ounces valued at \$463,807,309.

The following is, in part, from the *Review of the 1940 Silver Market* by Handy and Harman, New York:

"Towards the end of 1939 restrictions against the importation of silver into England and India isolated the silver markets of those countries from the rest of the world, thereby creating two silver markets. Throughout 1940 these two markets have continued to function separately—the world market, dependent for the most part upon the United States buying rate and typified by New York quotations, and the Anglo-Indian market, influenced chiefly by bazaar operations and represented by prices in pence and rupees.

"The world market was a wholly colourless affair. For the entire year the Treasury Department maintained its rate at 35 cents, with the result that the New York "official" did not vary from 34½ cents except for two short periods in May and June when the easing of Indian restrictions caused a moderate advance in price. The high quotation for the year was 35½ cents, attained on May 28th and 29th. During the first half of 1940 another unsuccessful attempt was made in Congress to bring about repeal of the authority for Government purchases of foreign silver, but this effort had no depressing effect upon world prices such as resulted from the previous year's endeavour. . . . We estimate world silver production at 278,000,000 ounces, apportioned as

follows: United States, 66,000,000 ounces; Mexico, 84,500,000 ounces; Canada, 25,000,000 ounces; South America, 32,500,000 ounces; all other countries, 70,000,000 ounces. . . . The year 1940 created a new record for the use of silver by the arts and industries in the United States and Canada. We estimate the amount at 41,000,000 ounces, an increase of more than 20 per cent over the preceding year. In the arts the consumption figures showed the following approximate percentage changes compared with 1939: sterling silverware, 30% increase; silver-plated ware, 5% decrease; jewelry, 10% increase. In the dental trade there was a decrease of 10%. In the purely industrial field, as distinct from the arts, larger quantities of silver were consumed except in the case of chemical salts where the amount remained practically unchanged. There was continued expansion in plating for non-silverware purposes, in the manufacture of electrical contacts and alloys for soldering and brazing, and in the construction of chemical equipment. Also there has been considerable use of silver of various compositions in shipbuilding for our navy and in the production of airplanes, guns and other equipment for national defense. . . . At the close of the year there was nothing to indicate any change in the United States silver-buying program or in the price the United States' Government will pay."

Table 73.—Production of Silver in Canada, by Provinces and by Sources, 1939 and 1940

	1939		1940	
	Quantity	Value	Quantity	Value
		\$		\$
NOVA SCOTIA—				
In gold bullion and in silver-lead-zinc ores exported (*) . Total	173,877	70,399	725	277
QUEBEC—				
In anode copper	943,403	381,965	1,168,316	446,869
In gold ores, and in copper and zinc concentrates exported	224,041	90,710	172,134	65,840
Total	1,167,444	472,675	1,340,450	512,709
ONTARIO—				
In silver bullion made in Canada from cobalt ores	1,465,920	593,522	1,127,219	431,150
In gold bullion	527,352	213,514	572,470	218,964
In blister copper	2,410,512	975,968	2,707,667	1,035,656
In ores, concentrates, residues, matte, etc. exported or treated in smelters outside the province	285,638	115,649	1,155,745	442,061
Total	4,689,422	1,898,653	5,563,101	2,127,831
MANITOBA—				
In blister copper	984,992	393,804	1,022,180	390,974
In gold bullion (gold mines)	43,493	17,609	11,332	4,334
Total	1,028,485	416,413	1,033,512	395,308
SASKATCHEWAN—				
In blister copper (a)	1,139,348	461,299	1,685,393	644,646
In gold bullion and in crude alluvial gold	2,252	912	6,147	2,351
Total	1,141,600	462,211	1,691,540	646,997
ALBERTA—				
In alluvial gold Total	32	13	20	8
BRITISH COLUMBIA—				
In alluvial gold	9,000	3,644	6,939	2,654
In gold bullion	94,805	38,385	96,877	37,093
In base bullion; and in ores, matte, etc., exported	10,544,226	4,269,146	11,781,640	4,506,359
Total	10,648,031	4,311,175	11,885,556	4,546,106
YUKON—				
In alluvial gold	19,254	7,795	17,979	6,877
In silver-lead ores shipped to smelter	(b) 3,811,610	1,543,245	(d) 2,241,364	857,299
Total	3,830,864	1,551,040	2,259,343	864,176
NORTHWEST TERRITORIES—				
In pitch-blende-silver ores shipped to smelters (*) and in gold bullion Total	483,874	195,911	59,505	22,760
Canada—Total	23,163,629	(c) 9,378,490	23,833,752	9,116,172

(*) Silver-lead ores exported in 1939 only.

(†) Comprises silver in silver sulphide, etc., made at the Eldorado refinery, Port Hope, Ont., plus silver in ores shipped to other metallurgical plants.

(a) Represents silver contained in blister copper made at the Flin Flon smelter from Saskatchewan ores.

(b) Includes 300 ounces from gold ores.

(c) Of this, 5,961,172 fine ounces represents silver in ores exported.

(d) Includes 160 ounces in gold concentrates exported.

NOTE:—For 1940 silver was valued at 38.25 cents per fine ounce, the average price of the metal on the New York market expressed in Canadian funds; for 1939 the corresponding price was 40.488 cents.

Table 74.—Production of Silver in Canada for 1930-1940

Year	Ounces	Cents per ounce	Year	Ounces	Cents per ounce
1930	26,443,823	38.15	1935	16,618,558	64.79
1931	20,562,247	29.87	1936	18,334,487	45.13
1932	18,347,907	31.67	1937	22,977,751	44.88
1933	15,187,950	37.83	1938	22,219,195	43.48
1934	16,415,282	47.46	1939	23,163,629	40.49
			1940	23,833,752	38.25

Table 75.—Source of Canadian Silver Production, by Percentages, 1939-1940

Source	1939	1940
In silver-cobalt ores	6.5	5.38
In base bullion (†)	39.7 (*)	44.39
In gold ores (bullion and placer)	4.6	3.60
In blister and anode copper	23.6	27.62
In matte, copper ores and silver-lead ores, etc., exported (other than silver-cobalt ores)	25.6	19.01
	100.0	100.0

(†) Chiefly from silver-lead ores.

(*) Includes silver recovered in Canada from pitchblende-silver ores.

Table 76.—Silver Consumed in Specified Canadian Industries, 1939 and 1940

	1939		1940	
	Fine oz.	Value	Fine oz.	Value
		\$		\$
Scientific equipment	562,158	241,542	612,198	244,569
Fountain pens and pencils		644,750		660,650
Jewellery and silverware (fine silver)		400,947		765,067
Jewellery and silverware (silver alloys)		18,914	44,973	17,821
Medicinal and pharmaceutical preparations (bullion)		4,027	7,943	3,177
Miscellaneous chemicals	10,067			

(a) Consumed largely in the manufacture of photographic film.

LEAD AND ZINC

The mines of British Columbia account for a large part of Canada's lead output, the Sullivan mine owned by the Consolidated Mining & Smelting Company Ltd. being by far the largest producer.

O. W. Roskell, in the Mining Journal, London, comments on lead and zinc in 1940 as follows:

"Except for those in the United Kingdom, all the European lead and zinc producers are virtually under Axis control. Spain, Sweden and Finland might still be regarded as exceptions, but the two latter countries are of little importance. One result of the domination of Europe has been a solution—of sorts—of the problem of the custom smelters in Belgium, Holland and Norway, to which attention was drawn in the review for 1939. Though the Belgians, in particular, had substantial stocks, by her invasion Germany has ensured that they will in future obtain only those concentrates which she herself can supply or which can, should she think it worth while, be railed across Europe to them. The virtual elimination from world trade of an important part of the total smelting capacity nevertheless left the question of over-production of concentrates virtually untouched. Towards the end of the year, however, there were signs that this difficulty was also becoming resolved. In 1940 about 20 per cent of the world lead production (1.7 million tons—world output) was accounted for by the Axis or countries under Axis control. Lead consumption was placed at 1.75 million tons in 1940 as against rather under 1.64 million tons in 1938, the corresponding figure for the Axis in 1940 being about 25 per cent. Zinc production in 1940 was estimated at slightly under 1.65 million tons, the Axis powers producing rather over

30 per cent and consuming slightly under 30 per cent of the total world consumption of about 1.8 million tons. The maximum prices for lead and zinc in the U.K. have been officially fixed".

Canada's zinc production includes zinc in ores exported in concentrates from the Stirling mine, Nova Scotia; zinc in concentrates made from the copper-gold-silver ores of northwestern Quebec; refined zinc made from the ores of the Flin Flon mine on the Manitoba-Saskatchewan boundary; zinc in concentrates exported by mines in British Columbia, and refined zinc made at Trail, B.C. by the Consolidated Mining & Smelting Company of Canada Ltd. Owing to the increased demand for zinc as a war material, interest in the construction of a zinc refinery in Eastern Canada was revived in 1940 and the zinc situation was closely studied by officials investigating or supervising the nation's war effort.

Table 77.—Production (†) of New Lead in Canada, 1931-1940

Year	Pounds	\$	Price per pound (Canadian funds)
1931.....	267,342,482	7,260,183	c. 2.710
1932.....	255,947,378	5,409,704	2.114
1933.....	266,475,191	6,372,998	2.392
1934.....	346,275,576	8,436,658	2.346
1935.....	339,105,079	10,624,772	3.133
1936.....	383,180,909	14,993,869	3.913
1937.....	411,999,484	21,053,173	5.110
1938.....	418,927,660	14,008,941	3.344
1939.....	388,569,550	12,313,768	3.169
1940*.....	471,850,256	15,863,605	3.362

Maximum annual value of Canadian lead production was \$23,127,460 in 1925.

(*) Year of maximum output of Canadian lead.

(†) Lead content of base bullion produced plus lead in ores exported.

NOTE.—For production by provinces see table I.

Table 78.—Refined Lead Production in Canada,* 1929-1940

Year	Pounds of refined lead produced	Year	Pounds of refined lead produced
1929.....	304,449,673	1935.....	1,327,515,277
1930.....	304,471,706	1936.....	1,363,449,490
1931.....	278,448,457	1937.....	1,399,394,939
1932.....	253,136,522	1938.....	1,400,763,914
1933.....	254,565,861	1939.....	1,381,137,424
1934.....	1,314,457,735	1940.....	1,440,175,333

Includes the electrolytic lead produced from Canadian and foreign ores at Trail, B.C.; and also the pig lead from Galletta, Ont., until 1931.

† Primary lead only.

Table 79.—Available Statistics on the Consumption of Lead in Specified Canadian Manufacturing Industries, 1939 and 1940

Industries	Items used	1939	1940
		Pounds	Pounds
Brass and copper products.....	Pig lead.....	750,208	884,114
	Scrap and other lead.....	363,129	310,747
Paints and pigments.....	Pig lead (*).....	17,949,541	14,518,428
White metal alloys.....	Pig lead.....	13,579,186	20,020,978
	Scrap lead.....	11,967,402	27,653,992
Electrical apparatus.....	Pig lead.....	23,118,853	30,433,619
	Scrap lead.....	237,026	222,300
	Other.....	2,150,838	2,727,291
Iron and steel.....	Lead.....	1,634,429	2,257,375
Explosives.....	Pig lead.....	800,831	649,282
Grand Total.....		72,551,443	99,678,126

(*) Some products such as lead oxides made from pig lead by the paints and pigments industry are sold to other industries for the manufacture of such products as storage batteries.

Since 1939 the Consolidated Mining and Smelting Company has produced antimony metal at the Trail Smelter; the total production of the metal from British Columbia ores in 1940 totalled 2,594,492 pounds valued at \$396,468. The 1939 production was the first commercial output of primary antimony metal in Canada in several years. Bismuth metal is also recovered at the Trail smelter from silver-lead-zinc ores, the production from these ores in 1940 amounting to 40,740 pounds valued at \$56,384. In addition to metals, there has been an increasing quantity of sulphur salvaged yearly in the smelting of silver-lead-zinc ores in the Trail plants of the Consolidated Mining and Smelting Company. This has been recovered in both the gaseous and elemental forms and is utilized in the manufacture of sulphuric acid and fertilizers.

Table 80.—Production* of Zinc from Canadian Ores, 1931-1940

Year	Pounds	Value
		\$
1931.....	237,245,451	6,059,249
1932.....	172,283,558	4,144,454
1933.....	199,131,984	6,393,132
1934.....	298,579,683	9,087,571
1935.....	320,649,859	9,936,908
1936.....	333,182,736	11,045,007
1937 (b).....	370,337,589	18,153,940
1938.....	381,506,588	11,723,698
1939.....	394,533,860	12,108,244
1940 (a).....	424,028,802	14,463,624

(*) Includes refined zinc and zinc in ores, etc., exported.

(a) Year of maximum Canadian zinc production.

(b) Year of highest annual value.

NOTE.—The total value of Canadian zinc production since the first recording of Canadian zinc statistics in 1898, and inclusive of 1940, totalled \$195,148,286. (For production by provinces see Table I.)

Table 81.—Refined New Zinc Produced in Canada, 1931-1940

Year	Price† per pound	Short tons	Year	Price† per pound	Short tons
	cents			cents	
1931.....	2.55	118,622	1936.....	3.31	151,103
1932.....	2.41	86,141	1937.....	4.40	158,542
1933.....	3.21	91,946	1938.....	3.07	171,932
1934.....	3.04	134,917	1939.....	3.07	175,641
1935.....	3.10	149,523	1940.....	3.411	185,722

† In Canadian funds.

The production of spelter in U.S.A. in 1940, exclusive of the production through graphite retorts, was 707,935 short tons, of which 32,660 was derived from secondary material and 85,287 from foreign ore. Of the derivation from foreign ore 61,027 was from Mexican ore. The smelter production in Yugoslavia in 1940 was 6,642 short tons.

According to the United States Bureau of Mines, the United States consumption and smelter production of primary zinc reached unprecedented proportions in 1940 as a result of the stimulation of industrial activity by the National Defence program and British orders for munitions. The quotation for prime western zinc at St. Louis was 5.75 cents per pound at the beginning of 1940; 7.25 cents at the close, and averaged 6.34 cents for the year compared with 5.12 cents in 1939 and 4.61 cents in 1938. After the German invasion of the low countries and the collapse of France early in May, shipments rose abruptly, reaching a high in September. Demand exceeded production in every month beginning with May, so that there was a steady decline in producers' stocks thereafter. Demand for zinc from abroad in 1940 necessitated importation into the United States of large quantities of foreign ore by smelters. In consequence, that production of foreign zinc increased more than four-fold over 1939 and was the largest output recorded since 1916. There were large increases in receipts of ore from Mexico, Canada and Newfoundland

in 1940. The zinc industry has undertaken a large building program and at the close of 1940 additions to several reduction plants were under way or scheduled for 1941. In some cases the United States government has co-operated by agreement to a 5-year amortization of investment as provided in recent tax legislation.

Table 82.—Available Statistics of the Consumption of Zinc in Specified Canadian Manufacturing Industries, 1939 and 1940

Industry	Items used	1939	1940
		Pounds	Pounds
Brass and copper products.....	Other zinc.....	559,567	413,726
	Zinc ingots and slabs.....	6,375,989	16,850,907
	Zinc scrap.....	50,637	108,155
White metal alloys.....	Zinc spelter.....	2,464,493	6,127,394
	Zinc scrap.....	771,921	1,428,594
Electrical apparatus.....	Zinc ingots and bars.....	1,764,270	1,605,305
	Zinc sheets.....	2,919,148	2,234,459
Acids, alkalies and salts.....	Zinc metal.....	4,467,640	8,346,576
Iron and steel.....	Zinc.....	34,149,679	40,908,539
Miscellaneous chemicals.....	Zinc sheets and spelter.....	226,965	227,796
Grand Total.....		53,750,309	78,251,451

In addition there are relatively large quantities of zinc oxide and lithopone used in the manufacture of paints.

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

1. Definition of the Industry.
2. General Review.
3. Commodity statistics, including tables showing production, prices, etc., for nickel, copper and metals of the platinum group.

1. Definition of the Industry

The nickel-copper industry in Canada includes the mining, smelting and, to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., and Clydach, Wales; during recent years matte was also exported to Norway, however, exports to that country ceased after its invasion by Germany in 1940.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production. Gold, silver, tellurium and selenium in increasing quantities are also recovered from these ores.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 11 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production statistics on nickel, copper and the metals of the platinum group are given in this chapter.

General Review

Canadian nickel production in 1940 totalled 245,557,871 pounds valued at \$59,822,591 an all time high record for the industry.

Almost the entire production of Canadian nickel in 1940 originated in the nickel-copper ores of the Sudbury district, Ontario, and represented the recovery of the metal in the refined state, in oxides and salts, and in matte exported. In addition to the nickel obtained from the Sudbury ores, there is a relatively small quantity of the metal recovered annually in the treatment of silver-cobalt ores from the Cobalt district of Northern Ontario.

Copper recovered from nickel-copper ores in 1940 represented 53 per cent of the total quantity of new copper produced from all sources in the Dominion during the year under review. The nickel-bearing deposits of the Sudbury area also contain relatively high values in platinum metals which are recovered in refining operations.

In addition to production of nickel, copper, and the platinum metals, there is an important recovery from these ores of the associated metals—silver, gold, selenium and tellurium; sulphur for the manufacture of sulphuric acid is also salvaged in the gaseous state from waste smelter gases. The total gross value of the various primary products of this Canadian industry, considered as a whole, was estimated at \$103,109,213 in 1940 compared with \$95,714,524 in 1939.

Two companies operated both mines and metallurgical plants in the Sudbury area in 1940. The International Nickel Co. of Canada, Limited, conducts smelting operations at Copper Cliff and Coniston, Ontario, while the Falconbridge Nickel Mines, Ltd., smelted their ores at the Falconbridge mine located a few miles east of the town of Sudbury. This last named company treated their matte in a refinery located at Kristiansand, Norway, until the invasion of that country by Germany in 1940. Matte produced by the Falconbridge Nickel Mines Ltd. is now treated in the Canadian plants of the International Nickel Co. of Canada, Limited.

The relatively small amount of nickel oxide produced at Deloro, Ontario, is recovered from silver-cobalt-nickel-arsenic ores mined in Northern Ontario. Smelter matte made by the International Nickel Co. of Canada, Limited is treated in plants located at Clydach, Wales; Huntington, West Virginia, and at Port Colborne and Copper Cliff, Ontario. Converter copper made by the International Nickel Co. is electrolytically refined at Copper Cliff.

The only other nickel-copper mining company to officially report work in 1940 was Nickel Offsets Limited, with properties in Foy, Bowell and Morgan townships of the Sudbury area. This Company stated that only surface exploration and road work were conducted during the period April 15 to December 15.

Capital employed in Canada by the nickel-copper mining, smelting and refining industry in 1940 was reported at \$132,818,804; employees totalled 12,339 and \$22,568,887 were distributed as salaries and wages. Fuel and electricity used in 1940 were valued at \$9,048,885 and the cost of chemicals, explosives and other process supplies consumed totalled \$13,150,095.

Table 83.—Principal Statistics of the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1939-1940 (*)

	1939	1940
Number of firms.....	(d) 4	(a) 3
Number of mines.....	7	6
Number of smelters.....	3	3
Number of copper refineries.....	1	1
Number of nickel refineries.....	1	1
Capital employed.....	\$ 128,302,729	132,818,804
Number of employees—On salary.....	341	928
On wages.....	11,155	11,411
Total.....	11,494	12,339
Salaries and wages—Salaries.....	\$ 1,195,565	2,623,307
Wages.....	\$ 19,362,273	19,945,580
Total.....	\$ 20,557,838	22,568,887
Fuel and purchased electricity used (c).....	\$ 7,437,370	9,048,885
Process supplies used (b).....	\$ 12,068,595	13,150,095
Estimated gross value of matte exported and Canadian refinery products.....	\$ 95,714,524	103,109,213
Value of production less items (b) and (c).....	\$ 76,208,559	80,910,233

(*) Does not include data for mines, power plants, etc., operated by subsidiary companies, data for copper refining in Ontario included in 1939 and 1940 but not in previous years.

(a) All in Ontario.

(d) 3 firms reported as active in Ontario and 1 in British Columbia.

Table 84.—Output from Canadian Nickel-Copper Mines and Smelters, 1938-1940

(Short tons)

	1938	1939	1940
Ore shipped from mines.....	6,276,232	7,850,636	8,356,196
Ore and concentrates treated(*).....	6,280,283	7,839,187	8,342,323
Blister copper produced in Ontario (a).....	147,439	155,880	167,908
Nickel produced in Ontario (b).....	62,141	65,883	83,739
Matte exported (c).....	63,423	71,315	58,398
Nickel content of matte exported.....	43,075	47,057 (d)	38,867
Copper content of matte exported.....	6,914	8,212	5,835

(*) Represents the tonnage of crude ore smelted together with the tonnage of ore milled.

(a) Copper content.

(b) Includes nickel content of salts and oxides produced.

(c) Less a relatively small tonnage of matte returned annually to Canada for retreatment since 1934 and in 1940 exclusive of anode copper exported.

(d) Includes 17 tons contained in anode copper exported for refining in U.S.A.

Table 85.—Capital Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1940

	\$
Present cash value of the land (excluding minerals).....	3,186,393
Present value of buildings, fixtures, machinery, tools and other equipment.....	106,790,487
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	14,606,629
Inventory value of finished products on hand.....	3,983,492
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,251,803
Total.....	132,818,804

Table 86.—Employees, Salaries and Wages, in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1940

	On salary		Mine		Mill	Total	Salaries and wages
	Male	Female	Surface	Under-ground			
Salaried employees—							
Mine and Mill.....	298	3				301	884,350
Smelters and refineries.....	558	69				627	1,738,957
Total	856	72				928	2,623,307
Wage-earners—							
Mine and mill.....			997	4,826	248	6,071	11,372,513
Smelters and refineries.....			5,340			5,340	8,573,097
Total			6,337	4,826	248	11,411	19,945,580
Grand Total	856	72	6,337	4,826	248	12,339	22,568,887

Table 87.—Number of Wage-Earners Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, by Months, 1939 and 1940*

Month	1939	1940	Month	1939	1940
January.....	10,361	11,345	July.....	11,373	11,428
February.....	10,355	11,402	August.....	11,496	11,342
March.....	10,627	11,483	September.....	11,281	11,339
April.....	10,952	11,458	October.....	11,235	11,364
May.....	11,287	11,441	November.....	11,687	11,493
June.....	11,428	11,502	December.....	11,757	11,344

* Includes data for copper refining for the first time in 1939.

NICKEL

Production figures include nickel in matte exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts produced, valued in the aggregate at the price obtained from the sales of oxides or salts.

Table 88.—Production of Nickel from Canadian Ores, 1931-1940

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
	*	\$		*	\$
1931.....	65,666,320	15,267,454	1936.....	169,739,393	43,876,525
1932.....	30,327,068	7,179,862	1937.....	224,995,946	59,507,176
1933.....	83,264,658	20,130,480	1938.....	210,572,738	53,914,494
1934.....	128,687,340	32,139,425	1939.....	226,105,865	50,920,305
1935.....	138,916,240	35,345,103	1940.....	245,557,871	59,822,591

(*) Includes a relatively small quantity of nickel recovered annually from silver-cobalt ores; Canadian nickel production comes entirely from Ontario ores with the exception of 1937 when a relatively small tonnage of nickel ore was exported from a property in British Columbia.

The following is from an address delivered at the annual meeting of the International Nickel Company of Canada Ltd. by the president of the company Robert C. Stanley:—

“The most important duty of your management during 1940, the first full year of operations under war-time conditions, was to provide an adequate supply of nickel, copper and platinum

metals to meet all demands for the war programs of His Majesty's Governments in Canada and Great Britain. Furthermore, the defence program of the United States Government, in conjunction with its policy of aid to Britain, is adding heavily to the toll on our output of nickel. To meet the situation we have not only continued our program of balancing smelter and refinery capacity with mine output, but have augmented and accelerated this program by making plant extensions wherever possible and utilizing all available facilities. In addition, we are treating and refining the entire bessemer matte output of Falconbridge Nickel Mines Limited. Due to these efforts nickel output was increased in 1940, and is being further expanded in 1941.

"Copper production resulting from increased nickel output, and from the treatment of Falconbridge bessemer matte, exceeded the capacity of our copper refinery and we found it necessary to make outside arrangements for the refining of a portion of our copper. The contract with His Majesty's Ministry of Supply for the delivery of about 80 per cent of our output of electrolytic copper, referred to in last year's address, expired on September 1st, 1940, and was renewed for another year."

COPPER

Production of new copper in Canada from domestic ores during 1940 totalled 655,593,441 pounds valued at \$65,773,061 compared with 608,825,570 pounds at \$60,934,859 in the preceding year. The 1940 output was the greatest ever recorded in Canada and its value was only surpassed by that of \$68,917,219 for the year 1937.

Of the 1940 output, 565,034,590 pounds were contained in blister or anode copper produced in Canadian smelters, 78,889,101 pounds in crude ores and concentrates exported and 11,669,750 pounds in matte exported. According to production by provinces, Quebec contributed 134,166,955 pounds, Ontario 347,931,013 pounds, Manitoba 75,267,937 pounds, Saskatchewan 20,484,954 pounds and British Columbia 77,742,582 pounds.

In Quebec the ores of the Horne, Normetal and Waite-Amulet mines were treated at the Noranda smelter; shipments from the Aldermac mine were consigned to both the Noranda and foreign smelters. Of the total Ontario output, the nickel-copper ores of the Sudbury district accounted for 347,485,369 pounds, or 53 per cent of the total Canadian copper production. Production in Manitoba and Saskatchewan represented copper contained in blister made by the Hudson Bay Mining & Smelting Co. Ltd. from ores of the Flin Flon and Sherritt Gordon mines. Copper output in British Columbia in 1940 came largely from the mines of the Britannia Mining & Smelting Co. Ltd. and the Granby Consolidated Mining, Smelting and Power Co. Ltd.; production by these companies was about equal in tonnage and the ores from the properties of both firms were exported to foreign countries. The two Canadian electrolytic copper refineries located at Copper Cliff, Ont. and Montreal East, Que. were in continuous operation throughout the year under review.

Under war-time control, the price of copper in Canadian funds averaged 10.086 cents per pound in 1940 compared with 10.092 cents in 1939.

Table 89.—Production (*) of New Copper in Canada, from All Sources, 1929-1940

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1929.....	248,120,760	43,415,251	1935.....	418,997,700	32,311,960
1930.....	303,478,356	37,948,359	1936.....	421,027,732	39,514,101
1931.....	292,304,390	24,114,065	1937.....	530,028,615	68,917,219
1932.....	247,679,070	15,294,058	1938.....	571,249,654	56,554,034
1933.....	299,982,448	21,634,853	1939.....	608,825,570	60,934,859
1934.....	364,761,062	26,671,438	1940.....	655,593,441	65,773,061

* Including copper in ores and matte exported and in blister and anode copper made in Canada.

Table 90.—Production of Copper in Canada, by Provinces and Sources, 1939 and 1940

	1939		1940	
	Pounds	Value	Pounds	Value
	\$			\$
PRODUCTION—				
By Provinces—				
Nova Scotia.....	1,269,179	128,086		
Quebec.....	117,238,897	11,831,749	134,166,955	13,532,079
Ontario.....	328,429,665	32,637,305	347,931,013	34,742,229
Manitoba.....	70,458,890	7,110,711	75,267,937	7,591,524
Saskatchewan.....	18,133,149	1,829,997	20,484,954	2,066,112
British Columbia.....	73,253,408	7,392,734	77,742,582	7,841,117
Northwest Territories.....	42,382	4,277		
Total.....	608,825,570	60,934,859	655,593,441	65,773,061
By Sources—				
In blister and anode copper produced.....	505,671,332	51,032,350	565,034,590	56,989,388
In ores, concentrates and copper matte exported (a).....	86,730,679	8,752,860	78,889,101	7,956,755
In nickel copper matte exported.....	16,423,559	1,149,649	11,669,750	826,918
Total.....	608,825,570	60,934,859	655,593,441	65,773,061

(a) Contains a relatively small quantity of copper contained in gold and silver ores shipped to Canadian smelters, no matte exported in 1940.

Table 91.—Production (a) of Refined Copper in Canada for Years Specified

Year	Tons	Year	Tons
1916*	483	1936.....	191,595
1917.....	3,901	1937.....	215,080
1918.....	3,809	1938.....	227,240
1919.....	3,467	1939.....	231,684
1935.....	173,290	1940.....	261,878

* First electrolytic copper produced commercially in Canada.

(a) From all sources.

Table 92.—Available Statistics on the Consumption of Copper in Specified Canadian Industries, 1939 and 1940

Industry	Item (Used)	1939	1940
Brass and copper products (a).....	(Ingots, wire bars, slabs, etc..... lb.	119,161,178	208,302,644
	Scrap..... lb.	3,770,561	5,527,865
	Pipe and tubing..... lb.	75,177	115,778
	Plates and sheets..... lb.	710,612	570,036
	Wire..... lb.	310,485	351,269
	Other..... lb.	112,730	151,187
White metal Alloys.....	(Scrap, all kinds..... lb.	2,411,785	4,098,077
	Copper—ingots and slabs..... lb.	115,851	290,498
Electrical Apparatus and Supplies.....	(Castings..... lb.	66,283	136,979
	Ingots, slabs, wire bars, etc..... lb.	694,178	1,675,341
	Rods..... lb.	29,159,186	50,755,124
	Scrap..... lb.	44,554	93,356
	Tubing and pipe..... lb.	303,897	452,911
	Sheets and plates..... lb.	446,535	575,871
	Wire, bare..... lb.	5,216,630	6,606,363
	Wire, enamelled..... \$	351,172	703,765
Iron and Steel and Their Products.....	Wire, other insulated..... \$	939,583	1,232,526
	Copper sheets, bars, etc..... lb.	6,842,523	10,841,787

(a) A relatively large part of the copper included under this industry is rolled into wire rods, which are sold to manufacturers of electrical cable; duplication to this extent results from the inclusion of these rods in the Electrical Apparatus Industry.

Table 93.—Canadian Copper Ore Reserves as Officially Reported

(American Bureau of Metal Statistics)

	Year	Province	Short tons ore	Average grade	Short tons copper
				%	
Falconbridge (a).....	1940	Ontario.....	7,502,000	0.94	70,500
Granby Consolidated—Allenby.....	1939	British Columbia..	14,438,006	1.38	199,200
Hudson Bay.....	1938	Manitoba.....	27,534,000	2.23	614,000
International Nickel (a).....	1939	Ontario.....	224,594,000	2.32	(b)7,214,000
Noranda.....	1939	Quebec.....	29,513,000	2.13	684,700
Normetal.....	1935	Quebec.....	752,600	2.13	16,700
Sherritt Gordon.....	1939	Manitoba.....	4,860,000	2.38	115,700
Waite-Amulet.....	1939	Quebec.....			
Amulet section.....	1940	Quebec.....	270,000	2.70	7,300
Waite section.....		Quebec.....	550,000	4.25	23,400
Britannia.....		British Columbia..	(c)	(c)	(c)
Consolidated Copper and Sulphur.....		Quebec.....	(d)	(d)	(d)
Aldermac Mines Ltd.....	1938	Quebec.....	1,716,000	2.00	34,300
Amulet Dufault (e).....	1940	Quebec.....	3,260,000	6.30	205,400

(a) Also produces nickel.

(b) Copper-nickel content.

(c) Data not available.

(d) Closed 1940.

(e) New company which took over "Lower A" orebody of Waite-Amulet.

METALS OF THE PLATINUM GROUP

The entire output of new metals of this group in 1940 was derived from the nickel-copper ores of the Sudbury district in Ontario, with the exception of 24 ounces of platinum recovered from alluvial deposits in the province of British Columbia.

Production from Ontario ores represented recoveries made from precious metal concentrates shipped by the International Nickel Company of Canada Ltd. and treated in plants located at Acton, England and Newark, New Jersey, U.S.A.; precious metals contained in matte made at the Falconbridge smelter were recovered in Norway until April, 1940, at which time the refinery of the company was seized by the German army; during the remainder of the year all matte made at the Falconbridge smelter was treated in the plants of the International Nickel Company of Canada Ltd. and recoveries of such metals were included with those reported by that company.

The 1940 annual report of the International Nickel Company of Canada Ltd. stated:—"No estimate of world consumption of platinum metals is available for 1940, but because of war-time restrictions there appears to have been a decline as compared with 1939. Jewellery markets probably took a smaller proportion of the total deliveries than in previous years, the industrial uses being proportionately greater. The company's markets for platinum metals, which were principally in Great Britain and the United States, went through the year without appreciable price changes, except in the case of iridium. Platinum, which opened the year at \$40 per ounce, declined gradually until September when the price reached \$36. Palladium remained steady at \$24, as did rhodium at \$125 and ruthenium at \$35 to \$40. Starting at \$125 in January, iridium was quoted at \$275 in December; of the latter metal the company's production is limited. In the chemical industry interest continued in the use of platinum and platinum-clad metal for equipment requiring the utmost corrosion resistance. Platinum metal alloys for contact points and for aircraft ignition systems were under further development."

Canada was probably the largest world producer of the platinum metals in 1940. In 1938, the last year for which complete data are available, the output of the principal producing countries was as follows: Canada, 292,203 fine ounces platinum metals; Russia, 120,000 ounces crude platinum; Union of South Africa, 58,734 ounces (crude and fine) platinum metals, and Colombia 29,460 ounces crude platinum. The United States, in 1938, reported a production of 42,043 ounces of crude platinum from placers; 7,247 troy ounces from domestic ores, etc. (refineries); and 64,291 troy ounces of secondary platinum metals. The United States is an important refining centre of both domestic and foreign platinum metals.

Table 94.—Production of Platinum Group Metals in Canada, 1939 and 1940

	Platinum		Palladium, Rhodium, Iridium, etc.	
	Fine ounces	\$	Fine ounces	\$
1939				
Ontario.....	148,877	5,221,712	135,402	4,199,622
British Columbia.....	25	877		
Total.....	148,902	5,222,589	135,402	4,199,622
1940				
Ontario.....	108,464	4,239,424	91,522	3,520,746
British Columbia.....	24	938		
Total.....	108,488	4,240,362	91,522	3,520,746

Table 95.—Production of Metals of the Platinum Group, 1931-1940

Year	Platinum				Palladium*	
	Lode		Placer		Fine oz.	\$
	Fine oz.	\$	Fine oz.	\$		
1931.....	44,725	1,595,117	50	1,783	39,313	786,260
1932.....	27,284	1,097,021	59	2,372	29,727	548,582
1933.....	24,746	856,190	40	1,400	31,009	645,043
1934.....	116,177	4,488,712	53	2,051	83,932	1,699,228
1935.....	105,335	3,444,455	39	1,275	84,772	1,962,937
1936.....	131,551	5,319,922	20	809	103,671	2,483,075
1937.....	139,355	6,761,760	22	1,066	119,829	3,179,782
1938.....	161,310	5,196,279	16	515	130,893	3,677,342
1939.....	148,877	5,221,712	25	877	135,402	4,199,622
1940.....	108,464	4,239,424	24	938	91,522	3,520,746

* Since 1933 includes other platinum metals, except platinum.

Table 96.—Production of Certain Metals of the Platinum Group, 1926-1932*

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			342	78,953
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						
1932.....	(a) 7,886	353,308						

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

* Since 1933 these metals are included with palladium as shown in preceding table.

Table 97.—Platinum Consumed in Canadian Jewellery and Silverware Industry, 1932-1940

Year	Value	Year	Value
	\$		\$
1932.....	26,928	1937.....	112,295
1933.....	35,714	1938.....	85,503
1934.....	38,307	1939.....	160,688
1935.....	45,627	1940.....	148,748
1936.....	101,129		

Table 98.—Platinum Metals Sold in the United States, as Reported by Refiners and Shown by Consuming Industries, 1940

(From Minerals Year Book, U.S. Bureau of Mines)

(In Troy ounces)

Industry	Platinum	Palladium	Iridium	Others	Total	Percentage of total
Chemical.....	31,174	1,624	(a)	(a)	(a)	(a)
Electrical.....	17,548	32,528	(a)	(a)	(a)	(a)
Dental.....	9,859	26,346	(a)	(a)	(a)	(a)
Jewellery.....	51,296	7,624	(a)	(a)	(a)	(a)
Miscellaneous and undistributed.....	13,101	1,197	(a)	(a)	(a)	(a)
Total.....	122,978	69,319	(a)	(a)	(a)	(a)

(a) Not reported.

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics Showing Production by Provinces and Prices on Aluminium, Antimony, Barium, Beryllium, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Radium, Selenium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Uranium, Vanadium and Zirconium.

1. General Review

Metal-bearing minerals, mined in relatively small quantities by a comparatively few operators, have been grouped by the Dominion Bureau of Statistics for consideration as a single industry. Included with the finally revised statistics relating to the Canadian production of these, are notes and statistical data pertaining to various rare or semi-rare metals or metalliferous ores produced in other countries. Metals or metal-bearing ores produced in Canada during 1940 and classified as miscellaneous include—antimony, bismuth, cadmium, iron ore, mercury, molybdenite, radium and uranium products, selenium, tellurium, tungsten concentrates and titanium ore. In addition to particulars relating to these metals or products, the report contains notes of a summary nature on beryl and beryllium, lithium, magnesium, sodium, calcium, aluminium, tin, vanadium and zirconium.

It is to be noted that the majority of the metals listed above as Canadian products and including bismuth, cadmium, selenium and tellurium, represent by-products recovered in the refining of lead, zinc or copper and, for this reason, such statistics as relate to their production in Canada are included with those of either the silver-lead-zinc mining industry, the copper-gold-silver mining industry, or the non-ferrous smelting and refining industry.

The gross value of production credited to this industry in 1940 totalled \$2,029,278 compared with \$524,977 in 1939. Employees totalled 445 in 1940 and salaries and wages paid amounted to \$628,025.

ALUMINIUM

The reduction of aluminium ores and the production of primary aluminium in Canada is confined to the province of Quebec. In this province the Aluminum Company of Canada, Limited, operates an ore treatment plant at Arvida and reduction plants at both Arvida and Shawinigan Falls. These three plants were in continuous operation throughout 1940. At the Arvida ore plant concentrates were made from British Guiana bauxite and aluminium ingot was produced in the two reduction works. The Company also operates fabricating plants at Shawinigan Falls, Quebec, and Toronto, Ontario, and a new plant for the production of aluminium products is now operated by the Company at Kingston, Ontario. Data relating to the aluminium industry are not included with those recorded in tables of this report. Bauxite from British Guiana, used for the production of aluminium, is washed and dried before being shipped; at Arvida, Quebec, it is treated by a standard chemical process to remove impurities, and pure aluminium oxide is recovered. Cryolite, necessary in the production of the metal, is largely imported from Greenland; synthetic cryolite is also used in making aluminium. A very large amount of electrical energy is utilized in the production of new aluminium metal from bauxite concentrates. No bauxite ores are mined in Canada and the principal bauxite producing countries are France, Hungary, United States, Yugoslavia, Italy, British Guiana, Dutch Guiana and Russia.

Primary aluminium production in the United States during 1940 exceeded the peak reached in 1939 by 26 per cent and consumption rose 35 per cent above that in 1939, according to the Bureau of Mines, United States Department of the Interior. A total of 412,560,000 pounds of new aluminium valued at \$75,292,210 was produced in the United States in 1940 contrasted with 327,090,000 pounds valued at \$64,600,000 in 1939. The apparent consumption of primary

aluminium in 1940 totalled 454,034,409 pounds compared with 335,337,860 pounds in 1939. At the end of 1940 aluminium was being produced at a rate exceeding 500,000,000 pounds annually. In order to meet the requirements of the national defence program, aluminium production will be further increased in 1941 and 1942 at the five reduction plants of the Aluminum Company of America and at a new plant of the Reynolds Metals Company at Lister (near Sheffield), Alabama. Output is expected to reach an annual rate exceeding 690,000,000 pounds by July, 1941, and 825,000,000 pounds by July, 1942, according to a report published by the Advisory Commission to the Council of National Defence.

During 1940 the United States consumed more bauxite, the ore of aluminium, than in any other year, according to the Bureau of Mines, United States Department of the Interior. Apparent domestic consumption in 1940 totalled 958,695 long tons, 22 per cent more than the 782,975 tons consumed in the previous peak year of 1939. While the aluminium industry, which produced 26 per cent more metal in 1940 than in 1939, accounted for most of the increased demand for bauxite, artificial abrasive and chemical manufacturers also used more ore. The larger demand in 1940 was met by a 17 per cent increase in domestic mine shipments and a 21 per cent increase in imports. Domestic shipments were equivalent to 47 per cent and net imports to 53 per cent of total apparent consumption. About three-fourths of the aluminium industry's supply came from abroad, chiefly from Surinam (Dutch Guiana).

United States bauxite output (mine shipments) in 1940 totalled 438,913 long tons (dried ore basis) and was valued at \$2,578,968, an increase of 17 per cent in quantity and 19 per cent in value over that in 1939. Of the domestic ore shipped from mine producers' and processors' plants (449,198 tons), the aluminium industry took 48 per cent, abrasive 29 per cent, chemical 18 per cent, and oil refining, refractory, steel and other industries 5 per cent.

Six mining companies operating in Saline and Pulaski Counties, Arkansas, accounted for 97 per cent of the 1940 bauxite output and for virtually all of the increased domestic production. For the first time Virginia produced a small tonnage of ore from very limited reserves in Augusta County. Shipments from Barbour and Henry Counties, Alabama, and from Sumter County, Georgia, continued to decline.

In the latter part of 1939 the British Government signed with the Aluminum Company of Canada a contract under which the United Kingdom takes the entire Canadian exports; although provision was made whereby contracts signed prior to the war would be fulfilled. Additions made to plants in 1940 allow for a considerable increase in Canada's productive capacity. The average nominal price in New York for aluminium 99 per cent pure in 1940 was 19 cents per pound.

Table 99.—Consumption of Aluminium in Specified Canadian Industries, 1939 and 1940

Industry	1939		1940	
	Pounds	Cost at works	Pounds	Cost at works
		\$		\$
Aluminum products (a).....	20,444,000	4,070,400	37,976,264	8,229,879
White metal alloys*.....	1,516,717	311,295	2,212,526	537,173
Electrical apparatus and supplies.....	1,873,516	619,155	.....	657,300
Brass and copper products (b).....	1,656,605	272,609	2,464,371	386,569
Iron and steel products (b) (c).....	3,500,581	824,194	4,199,111	1,073,792

(a) Largely for the manufacture of cooking utensils, cable, etc.

* In addition in 1940 there were consumed 3,039,750 pounds of scrap valued at \$369,933, and in 1939, 2,539,707 pounds at \$322,987.

(b) Includes scrap.

(c) Includes industries manufacturing cooking and heating apparatus, sheet metal products, etc.

ANTIMONY

Antimony metal is recovered in the metallurgical works of the Consolidated Mining and Smelting Company Ltd., Trail, B.C. In addition to the production of metal at Trail, the Pioneer Gold Mines of B.C. Limited exported approximately a carload of crude antimony ore to the United Kingdom. This was mined at Stuart Lake in the Omineca Mining District of British

Columbia; this property was active in 1940 during the period May to November. Canadian production in 1940 totalled 2,594,492 pounds valued at \$396,468, all from British Columbia.

In the province of Quebec, Reed Realities Ltd. reported the clearing out of an old tunnel on an antimony deposit located on Lot 28, Range 1, South Ham; work was conducted here from May 6 to June 22, 1940. Prior to the close of 1938 there had been no commercial production of antimony metal in Canada since 1917 and no by-product output of the metal since 1926, in which year it was reported as contained in silver-lead-bismuth bullion produced from cobalt-silver ores mined in Northern Ontario.

Minerals containing antimony occur in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, and the Yukon Territory. Stibnite (Sb_2S_3) occurs in the veins of the Reliance Gold Mines, Bridge River mining district, British Columbia, and in the same province at the property of the Gray Rock Mining Syndicate in the Truax Creek area, and at the Congress mine adjoining the Reliance property.

In June, 1941, domestic antimony metal was quoted—New York—14 cents per pound. Antimony ore, per unit of antimony contained, 56 to 55 per cent, \$1.30 to \$1.40; 58 to 60 per cent, \$1.50 to \$1.60; 60 to 65 per cent, \$1.75 to \$1.80; London, 60 to 65 per cent, 9s. per long ton unit, nominal.

Table 100.—Antimony Used in Specified Canadian Industries, 1939 and 1940

Industry	1939		1940	
	Pounds	\$	Pounds	\$
White metal alloys.....	(x) 671,118	70,855	735,051	113,881
Electrical apparatus and supplies.....	140,786	18,641	166,533	24,918

(x) Regulus. In addition the industry reported the consumption of 114,143 pounds of antimony ore valued at \$5,407 in 1939 and 357,579 pounds at \$17,193 in 1940.

BARIUM

A report on barium minerals by the Imperial Institute, London, contains the following information:

A series of lead-calcium-barium alloys known in some cases as Frary metal and others as Ferry metal, are used for bearing purposes. The amount of barium is about 2 per cent and the bulk of the alloy is lead. The alloys are manufactured electrolytically from molten chlorides using a cathode of molten lead, and are used in the same manner as other 'white' metals. Aluminium and barium form a series of alloys which have greater fluidity than pure aluminium. A range of barium-aluminium and barium-magnesium alloys are being produced by an English firm under the trade names 'Baral' and 'Barmag'. The proportion of barium varies up to as much as 50 per cent, but the consumers in the wireless valve trade usually require the 'Baral' alloy to contain 45 to 50 per cent of barium and the 'Barmag' alloy to carry 25 to 30 per cent barium. With nickel, barium forms an alloy (0.2 per cent barium) which is stated to exhibit greater resistance to the action of hot corrosive gases than does pure nickel, and on this account it has been used for the manufacture of sparking plug electrodes.

The U.S. Bureau of Mines reports that barium metal is now made in the United States, chiefly to supply the small requirements for radio, vacuum and thermionic tubes where it is used as a "getter" along with lithium, potassium and calcium. The metal is not yet produced commercially in Canada. Current prices for barium are not available, but in 1936 it was available at approximately \$5.00 per pound or less.

BERYLLIUM

The principal ore of beryllium is the mineral beryl— $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$. There are several known occurrences of this mineral in Canada and shipments of beryl have been made for experimental purposes from deposits in Renfrew county, Ontario, and the Oiseau river area in Manitoba. Beryl usually occurs in pegmatites and is sometimes recovered as a by-product in the mining of

the feldspar and mica content of these rocks. No commercial production of beryl has ever been officially reported in Canada. No mining or shipments of beryllium ores were officially reported in Canada during 1940.

The Minerals Year Book of the U.S. Bureau of Mines for 1940 reports on beryllium as follows:

"Beryllium production is still an infant industry, but in 1940 it grew lustily. Most of the metal is now produced as a 4-per cent master alloy with copper, in which form it is sold at \$15 per pound of contained beryllium, whereas beryllium metal of domestic manufacture costs approximately \$45 a pound compared with \$100 formerly charged for German-produced metal of less purity. Wrought beryllium alloys—which are made by remelting the master alloy and which are ready for fabrication—now range from 0.1 to 2.25 per cent in beryllium content. Best-known and longest on the market is a binary alloy containing 2 to 2.25 per cent beryllium. The base price for strip and other merchant forms of this alloy is 96 cents per pound when copper is 10 cents (98 cents at 12-cent copper). By adding a little cobalt (0.25 per cent, for example), which seems to stabilize the properties and improve uniformity as well as to facilitate precipitation hardening, the B ϵ content can be reduced to 1.8 per cent without loss of properties obtainable by heat treatment. Another alloy on the market contains approximately 0.5 per cent beryllium and 2.6 per cent cobalt, and there is also one with only about 0.1 per cent beryllium and 0.3 per cent chromium, the remainder being copper in both instances. These two alloys are primarily electrical alloys (conductivity, approximately 50 and 70 per cent that of copper, respectively) with excellent strength and hardness. The 2.6-per cent cobalt alloy, however, is reported also to have an unusually high endurance limit at temperatures around 500° F.

"The present high cost of beryllium is not due to the cost of raw materials or lack of efficient processes for recovery of the metal from beryl. Even under present conditions the metal probably could be sold with a good profit at \$5.00 per pound, provided the volume of sales was large enough to carry the heavy expenses of laboratory and market research and general overhead. . . . Actually the offerings of beryl have greatly exceeded demand, and now both leading American beryllium companies are confident that as the industry grows ore supplies will grow proportionately. Statistics of United States production or consumption of beryllium cannot be published, but information available indicates that United States production of beryl has ranged in recent years from less than 100 to a maximum of not more than 200 tons a year, whereas imports have been increasing. Imports of beryl in 1940 rose to a new record—805 short tons valued at \$22,865, of which 422 tons came from Argentina, 377 from Brazil and 6 from South Africa."

Engineering and Mining Journal, New York, in June, 1941 quoted beryllium-copper, master alloy 4 per cent beryllium, remainder copper, in lots one pound or more of beryllium, \$15 per pound of contained beryllium. Beryllium ore—per ton (2,000 pounds), carload lots, minimum 10 per cent BeO; minimum 12 per cent, \$35 f.o.b.

No imports into Canada of beryllium, described as such, were reported in 1940. It may, however, enter in the form of special alloys.

BISMUTH

Bismuth production in Canada during 1940 and recent years represented the metal recovered from silver-lead ores smelted at Trail, B.C. and the metal contained in silver-lead-bismuth bullion produced in the treatment of silver-cobalt ores at Deloro, Ont. Production in 1940 totalled 58,529 pounds valued at \$81,004.

Imports of metallic bismuth into Canada in 1940 totalled 5 pounds valued at \$11 compared with 10,252 pounds at \$10,835 in 1939; these imports came entirely from the United States. Imports of bismuth salts into Canada in 1940 were appraised at \$17,516 compared with \$8,671 in the preceding year.

Mineral Industry states that it is impossible to arrive at any actual figures for world output of bismuth. The United States Bureau of Mines estimated world consumption in 1939 at about 2,600,000 pounds of which Europe accounted for 2,000,000 pounds and the United States for 500,000 pounds. The Cerro de Pasco Copper Corp. is the world's chief producer of

bismuth, recovering it as a by-product at its copper and lead plants in Peru. Commercial production of bismuth has been also reported in Australia, Bolivia, Mexico, Argentina, Spain, Japan and Germany.

Bismuth is consumed chiefly in the manufacture of pharmaceuticals and alloys. According to U.S. Bureau of Mines report, pharmaceutical and medicinal manufacturers have heretofore used about 75 per cent and low-melting-point and non-shrinking alloys the balance. The metal is employed in almost all low-melting metallic alloys used for fusible plugs, safety devices, dental models, soft solders and tempering baths for small tools and pieces. The principal alloying components used with bismuth are lead, tin and cadmium. The recently developed free-cutting aluminium alloy 11S contains a small percentage of bismuth. Bismuth also is used in small quantities in iron castings, in special brake linings, in enamelling and the manufacture of optical glass, in the manufacture of special instruments, and in plastics as bismuth subnitrate. *Metal and Mineral Markets*, New York, quoted bismuth metal, June, 1941—per pound, in ton lots \$1.25; London 4s. 6d.

Table 101.—Production* of Bismuth in Canada, 1931-1940

Year	Pounds	\$	Year	Pounds	\$
1931.....	118,207	157,650	1936.....	364,165	360,523
1932.....	16,855	7,340	1937.....	5,711	5,654
1933.....	78,303	81,526	1938.....	9,516	9,754
1934.....	253,644	301,215	1939.....	†409,449	466,362
1935.....	13,797	13,245	1940.....	58,529	81,004

* First commercial production in 1924.

† High record output.

Table 102.—Bismuth Used in the Manufacture of Canadian Medicinal and Pharmaceutical Preparations, 1939-1940

Item	1939		1940	
	Pounds	\$	Pounds	\$
Bismuth metal.....	18,155	16,821	30,076	36,454
Bismuth salts.....	13,430	21,815	13,527	26,136

BORON

According to the United States Bureau of Mines, boron alloys are supplied by United States manufacturers, small quantities being used in the nonferrous-metals industries and in steel making. In cast iron, boron opposes graphitization on solidification and exerts an energetic whitening effect, producing a hard strong iron but reducing malleability.

Boron carbide, boron carbide shapes and calcium boride are now produced in Canada.

About 30 per cent of the output of borax is used as a flux in the enamelling industry and another 30 per cent as a flux in glass making. The United States supplies most of the borax and boric acid requirements of the world. A maximum price of \$41.50 per ton for borax was set by the United States price administration in 1941.

CADMIUM

Cadmium production in Canada represents the recovery of the metal as a by-product in the electrolytic refining of zinc. Production up to 1935 came entirely from the treatment of zinc-bearing ores at Trail, British Columbia, by the Consolidated Mining and Smelting Company of Canada, Limited. The commercial production of the metal from the copper-gold-silver-zinc ores of the Flin Flon mine was commenced in Manitoba for the first time in 1936. Canadian output of cadmium in 1940 totalled 908,127 pounds valued at \$1,056,152.

Cadmium is consumed largely in the manufacture of alloys and for plating, also in the making of such pigments as cadmium lithopone, cadmium yellows, etc. A relatively large quantity of the metal is used in the production of bearing metals for high-speed internal combustion engines. It was reported after the outbreak of war in September that both the demand and market prices of cadmium showed a decided increase. *'Metal and Mineral Market'*, New York, quoted cadmium, June, 1941, per pound, commercial sticks, wholesale quantities, 90 cents.

"Mineral Industry" stated that in 1939, on the basis of the 1938 outputs, Germany now has under its control not only the home output of 432 metric tons, but also the Polish output of 244 tons; the Norwegian, of 208 tons; the Belgian, of 259 tons; and presumably the French output of 116 tons. This is a total of 1,259 tons out of a world total of about 4,100 tons. But it must be remembered that of these countries, Norway, Belgium, and France work almost entirely on imported ores, also much of the output in Germany has in the past been derived from cadmium bearing flue dust imported from Mexico and Southwest Africa.

Table 103.—Cadmium Production in Canada, 1928-1940

Year	British Columbia		Manitoba		Saskatchewan	
	Pounds	\$	Pounds	\$	Pounds	\$
1928*	491,894	341,374				
1929	773,976	675,294				
1930	456,582	337,871				
1931	323,139	180,958				
1932	65,425	26,824				
1933	246,041	78,733				
1934	293,611	95,665				
1935	580,530	441,203				
1936	526,034	468,170	148,133	131,838	111,749	99,457
1937	436,431	715,747	164,223	269,326	144,553	237,067
1938	510,342	410,090	115,166	92,543	73,630	59,166
1939	799,253	563,241	73,830	52,029	66,608	46,939
1940	778,791	905,734	57,742	67,154	71,594	83,264

* First production.

Table 104.—Cadmium Consumed by Specified Canadian Industries, 1939-1940
(Pounds)

Industry	1939	1940
White metal alloys.....	76,072	121,008
Steel foundries.....	1,525	6,000
Iron foundries.....	2,658	9,528
Non-ferrous smelters.....	1,344	
Other industries.....	309	5,483
Total Accounted For.....	82,208	142,019

Statistics relating to Canadian exports or possible imports of cadmium were not published separately by the Department of National Revenue, Ottawa prior to 1939. In 1939 Canada exported 1,049,853 pounds of cadmium valued at \$788,180, of which 978,525 pounds worth \$750,836 went to the United Kingdom.

CALCIUM

There is no commercial production of calcium metal in Canada and data relating to possible imports of metallic calcium into the Dominion are not published. The Minerals Year Book of the United States Bureau of Mines contains the following information pertaining to the metal:

"Metallic calcium, produced before the European War almost exclusively abroad, chiefly in France, is now made in the United States, the leading consumer. It is employed more and more for grain-refining alloy steel and in small amounts in some magnesium products. Various uses, as summarized by C. L. Mantall, include: (a) Deoxidizer and alloy agent for copper, lead, and other nonferrous metals; (b) preparation of high-temperature, high-resistance nickel-chrome and

nickel-chrome-iron alloys; and (c) as a reducing agent, in form of hydride, in the manufacture of rare metals, such as, titanium, uranium, vanadium, and zirconium.

"The lead base bearing metal hardened with calcium and barium (Frary metal) does not require the metals in its manufacture, but is produced by direct electrode position of these metals into a fused lead cathode. In the event of scarcity of tin and antimony for babbitt metal, and of antimony for storage battery plates, lead hardened with calcium and barium may be used as a substitute."

Calcium metal was quoted in the United States, September, 1939—per pound, 98 to 99 per cent—75 cents—ton lots—lump. No quotations were published during 1940.

CHROMITE

The mineral chromite (FeO , Cr_2O_3) is the commercial source of the metal chromium; it is also used extensively in the manufacture of refractory brick. The metal is a necessary constituent of many high-speed cutting tools, certain armour plate, and stainless steels. Chromite is also used in the manufacture of chromic acid for electroplating and in the manufacture of chemicals used chiefly in the dyeing, tanning and pigment industries. The Bureau of Mines, Ottawa, states that metallurgical ores should contain not less than 48 to 50 per cent Cr_2O_3 and as little iron as possible.

The principal chromite producing countries are Russia, South Africa, Turkey, Southern Rhodesia, Cuba, New Caledonia, Yugoslavia, India, and Philippine Islands. Production of the mineral in Canada during recent years has been relatively small, coming almost entirely from the Eastern Townships, Quebec. During the past few years considerable development work was conducted on a chromite deposit located at Obongo Lake, in the Thunder Bay district of Ontario; shipments were made from this property in 1935, 1936 and 1937. The owners of this mine, The Chromium Mining and Smelting Corp. Ltd., also have a modern electric smelting plant at Sault Ste. Marie, Ontario, for the production of ferrochrome and ferrosilicon from imported ores; chrom-X, an exothermic alloying agent is produced at this plant.

Canadian production in 1940 came entirely from the Eastern Townships in the province of Quebec, and chiefly from deposits located on Lot 7, Range 12, Orford Tp. and Lot 28, Range 10, Brompton Tp. These deposits were worked by H. B. Fletcher. Other chromite mining operations in 1940 included development work on Lot 17, Range a, Coleraine Tp. by Thetford Ferrochrome Co. Limited; surface work and diamond drilling at the Sterrett mine in Cleveland Tp., Richmond County, by Chromite Limited and the cleaning out of old pits on Lot 15, Range 1 of South Ham Tp. by Reed Realities Ltd. During 1940 a trial shipment of chromite was made from the Thetford mines area by W. R. Metulier and a relatively small tonnage of the mineral was recovered as a by-product by the Asbestos Corporation Ltd.

In British Columbia, exploration and development work has been conducted during the past on several chromite deposits but there have been no reports made to the Dominion Bureau of Statistics, Ottawa, of recent activities at these properties.

"Metal and Mineral Markets", New York, quoted chrome ore June, 1941:—Per long ton C.I.F. Atlantic Ports: Turkish concentrates 48 per cent Cr_2O_3 , not quoted. Indian and African, 48 per cent metallurgical ore \$43 to \$45; ordinary ore, \$37 to \$39; 43 to 45 per cent, refractory ore, \$25 to \$26. Prices nominal.

Corresponding prices May, 1940 were:—Turkish, 48 per cent Cr_2O_3 concentrates, \$29 to \$30; Indian, 48 per cent, \$25 to \$26; 43 to 45 per cent refractory, \$21 to \$22.

Table 105.—Production of Chromite in Canada, 1929-1940

Year	Short tons	\$	Year	Short tons	\$
1929.....	126	900	1935.....	1,144	14,947
1930.....			1936.....	(a)	13,578
1931.....			1937.....	(a)	43,250
1932.....			1938.....		
1933.....	78	1,113	1939.....		
1934.....	30	343	1940.....	355	5,780
	111	1,578			

(a) Quantity not published.

Production in 1918 was 21,994 tons valued at \$867,122; of this output 670 tons valued at \$36,395 came from Cascade in the Rossland district, British Columbia, and the balance from Quebec province.

Table 106.—Consumption of Certain Chromium Products and Chrome Ore in Specified Canadian Industries, 1939 and 1940

Industry	Item	1939		1940	
		Pounds	\$	Pounds	\$
Ingots and castings	Chrome ore	3,747,520	53,961	1,010,240	20,503
Ingots and castings	Ferrochrome	2,228,800	175,759	4,350,080	336,317
Paints, pigments and varnishes	Chrome colours	1,592,092	252,100	1,789,510	310,255
Paints, pigments and varnishes	Sodium bichromate	524,675	43,044	796,995	71,407
Leather tanning	Sodium bichromate	625,997	14,569	1,809,919	154,829
Glass manufacture	Chromite	20,000	491	8,000	193

NOTE.—In addition to the items listed above, a considerable quantity of chromite is utilized in the manufacture of Canadian ferro-alloys, also a relatively small quantity of sodium bichromate is consumed in the chemical industry. Chromite is also employed in Canada in the manufacture of refractories.

IRON ORE

No iron ores, known as such, were mined in Canada for some years prior to 1939. Nova Scotia with its large iron and steel industry is not a producer of iron ore. The large deposits of high-grade ore in Newfoundland, owned by the Dominion Steel and Coal Corporation, are much more readily accessible and of a higher and more constant grade than the iron ore deposits in Nova Scotia.

Iron ore was first mined and smelted in the province of Quebec early in the eighteenth century, and from that time until 1883, the industry was carried on almost continuously at Three Rivers in the St. Maurice district. Other furnaces using local ore were operated at Radnor Forges and Drummondville, the last to shut down being the Drummondville furnace in 1911. At the present time only titaniferous ore is mined in Quebec; this ore is produced near Baie St. Paul and is shipped for its titanium content.

A very considerable tonnage of iron ore has been shipped from properties in Ontario during past years. These shipments included both hematite and magnetite. In 1940 commercial shipments of beneficiated ore were continued from the new Helen mine in the Michipicoten district and were made by Algoma Ore Properties Limited. During the year under review, iron ore was also shipped from old dumps of the Bessemer mines in Eastern Ontario, while at Atikokan, in the Rainy River district, exploration of the Steep Rock Lake hematite deposits was continued throughout the year by Steep Rock Iron Mines Limited. Canadian production of iron ore in 1940, all from Ontario, totalled 414,603 tons valued at \$1,211,305.

Different varieties of iron ore are found in various parts of British Columbia, the most important of which are the magnetite deposits which occur on the islands along the coast. No work on these deposits was reported in 1940.

Imports of iron ore into Canada during 1940 totalled 2,418,237 short tons valued at \$5,513,215 compared with 1,764,844 short tons at \$4,179,353 in 1939.

Iron ore quotations in the United States, August, 1939, were as follows:—per long ton, Lower Lake Ports, Lake Superior Ore—Mesabi, non-bessemer, $51\frac{1}{2}$ per cent iron \$4.95. Old range, non-bessemer, \$5.10. Mesabi, bessemer, $51\frac{1}{2}$ per cent iron \$5.10. Eastern ores, per long ton unit, delivered at furnaces: Foundry and Basic, 56 to 63 per cent, 9 to $9\frac{1}{4}$ cents, June, 1941, quotations for Mesabi, non-bessemer, $51\frac{1}{2}$ per cent iron, \$4.45. Old range, non-bessemer, \$4.60. Mesabi, bessemer, $51\frac{1}{2}$ per cent iron, \$4.60. Old range, bessemer, \$4.75. Eastern ores Foundry and Basic, 56 to 63 per cent, 10 cents per long ton unit. Prices for foreign ores nominal.

The output of iron ore in the United States in 1940 is estimated by the Bureau of Mines, United States Department of the Interior, at 73,806,000 gross tons, an increase of 43 per cent over the quantity mined in 1939. The output in 1940 was, except for 1916 and 1917, the largest on record. The ore shipped from mines in 1940 is estimated at 74,969,000 gross tons valued at \$191,734,000, an increase of 37 per cent in quantity and 21 per cent in total value compared with 1939. The above figures do not include ore that contained 5 per cent or more of manganese in the natural state.

The average value of the ore at the United States mines in 1940 is estimated at \$2.56 per gross ton; in 1939 it was \$2.89. The stocks of iron ore at the mines at the end of 1940, mainly in Michigan and Minnesota, were 3,502,000 gross tons, a decrease of 26 per cent from 1939.

With the United States steel industry operating at 73 per cent of capacity during each of the first quarters of 1940, advancing to 88 during the third quarter, and reaching 95 during the last quarter, thus establishing an all-time record output, operating schedules at iron-ore mines in the Lake Superior district were keyed to meet not only the 1940 requirements but to build up stocks at docks and furnaces sufficient to last until the 1941 navigation season opens. To accomplish this task, the entire ore fleet was engaged part of the season. Although severe storms on the Great Lakes in November resulted in the movement of about 2,000,000 tons less than expected, shipments down the Lakes for the season exceeded 63,000,000 tons and were the third largest on record.

Table 107.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1931-1940

Year	To Nova Scotia	To United States	To Europe	Total Ship- ments
	Short tons	Short tons	Short tons	Short tons
1931.....	234,148	25,670	530,079	789,897
1932*.....			166,303	166,303
1933.....			254,383	254,383
1934*.....	346,178		344,769	690,947
1935.....	611,581		81,123	692,704
1936.....	527,540	12,656	252,676	792,872
1937.....	702,714	50,490	1,242,088	1,995,292
1938.....	555,348		1,305,068	1,860,416
1939.....	576,198	16,184	980,098	1,572,480
1940.....	762,310	26,118	789,578	1,578,006

* Shipments to Europe in 1930, 1932 and 1934 were to Germany only, while from 1935 to 1938 shipments went to both Germany and Great Britain. Shipments to Germany in 1938 totalled 1,256,230 short tons, and in 1939, 768,743 tons. In 1940 all European shipments went to Great Britain.

IRON AND STEEL AND THEIR PRODUCTS

The Primary Iron and Steel Industry

Statistics for the Primary Iron and Steel Industry include data for all establishments in Canada which were engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (c) steel ingots and steel castings, (d) hot rolled iron and steel products, (e) cold rolled or cold drawn steel bars, strips and shapes. Thirty-nine firms were included in this industry in 1940 and reports were received for 54 different plants or departments, including 4 blast furnace departments, 4 ferro-alloy plants, 30 steel furnace divisions, and 16 rolling or drawing mills. Separate reports were received for blast furnace departments, for steel furnace divisions and for rolling mills even when all three were units of a single works.

Factory sales of pig iron, ferro-alloys, steel ingots and castings and finished rolled products were 50.9 per cent higher in 1940 than in 1939, the values being \$114,598,409 and \$75,934,481, respectively. Twenty-five works in Ontario accounted for 66.6 per cent of the total for Canada or \$76,335,959; six plants in Nova Scotia accounted for 19 per cent or \$21,717,799; fourteen plants in Quebec for 11.8 per cent or \$13,563,176, while the remaining \$2,981,475 or 2.6 per cent was accounted for by 4 plants in Manitoba, 4 in British Columbia and 1 in Alberta.

Fixed and working capital employed in this industry amounted to \$133,844,814, including \$80,550,988 for the value of land, buildings and plant equipment, \$30,279,428 for the value of raw and finished materials on hand and in process, and \$23,014,398 for operating capital, such as, cash, bills and accounts receivable. For works in Ontario the capital was \$87,416,818; in Nova Scotia, \$25,847,776; in Quebec, \$18,108,891; in Manitoba, \$2,132,547, and in Alberta and British Columbia, \$338,782.

In 1940, an average of 17,774 people were employed in this industry, this being an increase of 28.5 per cent over the 1939 average of 13,827. About 1,240 persons worked in the blast furnace departments during the year, 5,692 in the steel furnaces, 9,803 in the rolling mills and 1,039 in ferro-alloy plants (exclusive of those producing ferro-alloys as a by-product). Sixty-five per cent

of the employees or 11,537 worked in plants in Ontario, 2,973 in Quebec, 2,579 in Nova Scotia, 547 in Manitoba and 138 in Alberta and British Columbia.

Payments in salaries and wages during 1940 amounted to \$29,207,036, a gain of 43.1 per cent over the previous year's total of \$20,410,517. Salaries advanced to \$3,488,044 from \$3,003,672 and wages to \$25,718,992 from \$17,406,845.

Materials used in manufacturing processes cost \$54,045,692 in 1940 compared with \$29,629,376 in 1939, and the cost of fuel and electricity was \$9,582,791 against \$6,174,661, an increased expenditure of 82.4 per cent for materials and 55.2 per cent for fuel and power.

PIG IRON

Output of 1,168,839 tons of pig iron in 1940 was 55 per cent over the 755,731 tons reported for the previous year. Production of basic iron amounted to 974,629 tons or 83 per cent of the total; foundry iron amounted to 107,924 tons and malleable iron to 86,286 tons.

Producers' sales of pig iron totalled 247,599 tons at \$5,868,769 in 1940 compared with 171,977 tons at \$3,757,573 in 1939, a gain of 44 per cent in quantity and 38 per cent in value.

A review of the year's output by months shows that 104,703 tons were made in January, after which the tonnage ranged between 84,000 and 95,000 until July, reached 105,020 tons in September and closed the year at the high of 110,422 tons in December.

Charges to iron blast furnaces during the year included 1,953,638 tons of imported iron ore, 138,074 tons of Canadian ore, 1,223,173 short tons of coke, 454,376 short tons of imported limestone and 25,075 short tons of Canadian limestone.

Imports of pig iron during the calendar year advanced to 26,521 tons from 587 tons in 1939 while exports dropped 3,672 tons from 10,728 tons.

Producers' stocks at the end of 1940 totalled 68,357 tons compared with 61,763 tons at the end of the previous year.

The apparent consumption of pig iron in Canada, as calculated by deducting the exports from the sum of the production and imports, and allowing for changes in producers' stocks, amounted to 1,185,094 tons in 1940 or 46 per cent more than in 1939 when the apparent domestic supply was 811,736 tons.

Producers of pig iron in Canada have 10 blast furnaces which could produce 1.5 million tons a year if operated to their rated capacity. Actual production of 1,168,839 tons in 1940 showed an operating rate of about 78 per cent. Only 9 furnaces were put in blast during the year; the furnace remaining out of blast is rated at 300 tons a day but has been inactive for several years.

FERRO-ALLOYS

Ferro-alloys were made in 1940 by 11 different concerns, 5 of which recovered ferrosilicon as a by-product in the manufacture of abrasives. Output of ferro-alloys in 1940 amounted to 133,388 tons, a gain of 74 per cent over the 76,375 tons reported for 1939.

Altogether, ferrosilicon was made in ten different plants, spiegeleisen in two and ferrochrome in two. Other alloys produced by one firm only included ferromanganese, silicospiegel, silico-manganese, silicon metal and calcium silicon.

STEEL INGOTS AND CASTINGS

Steel production advanced 45 per cent to 2,012,294 tons in 1940 from 1,384,870 tons in 1939, the output of steel ingots going to 1,944,313 tons from 1,330,408 tons and steel castings to 67,981 tons from 54,462 tons. Factory sales of ingots and castings totalled 128,506 tons at \$12,616,483.

Thirty steel plants were in operation during the year. These plants had 97 furnaces, including 46 basic open hearth with an annual capacity of 2,215,071 tons, 48 electric furnaces rated at 267,931 tons and 3 converters at 2,750 tons. Of the 30 companies, 18 made electric castings only, 3 made electric ingots only, 2 made basic open hearth ingots only, 2 made converter castings only, 1 made electric and converter castings, 1 made basic ingots and castings, 1 made basic ingots and castings and electric ingots, 2 made basic ingots and castings and electric castings.

Operating steel furnaces in 1940 used 967,134 tons of pig iron, 1,185,277 tons of scrap iron or steel, 130,052 tons of ore, 165,975 short tons of limestone, 81,233 short tons of dolomite, 69,206 short tons of lime, 32,243 short tons of silica sand, 13,673 short tons of magnesite and 32,207 tons of ferro-alloys.

ROLLED AND DRAWN STEEL

In 1940 there were 13 hot rolling mill plants in operation, 1 cold rolling plant and 2 mills making cold drawn shapes. Nine of these mills were in Ontario, 3 in Nova Scotia, 3 in Quebec and 1 in Manitoba. In addition, 1 rolling mill in Ontario and 1 in Alberta were idle throughout the year.

Rolling mill sales advanced 46 per cent to \$85,907,967 from \$58,978,429 in 1939. The main items sold during the year under review were—326,280 tons of hot rolled bars at \$23,078,104; 281,616 tons of plate, sheet, hoop, band and strip at \$23,143,298; 212,386 tons of rails and rail fastenings at \$10,135,840; 193,445 semi-finished rolled forms, such as, blooms, billets, etc., at \$8,707,852; 160,963 tons structural shapes at \$8,667,678; 117,192 tons wire rods at \$5,305,124, etc.

Table 108.—Provincial Distribution of Active Plants in the Primary Iron and Steel Industry, 1940

Province	Number of firms	Pig Iron		Steel Ingots and Castings		Rolling and drawing mills	Ferro-alloys (a)
		Number of plants	Number of blast furnaces	Number of plants	Number of steel furnaces		
Nova Scotia.....	4	1	3	2	16	3	
Quebec.....	13			10	21	3	1
Ontario.....	16	3	7	10	46	9	3
Manitoba.....	3			3	4	1	
Alberta.....	1			1	1		
British Columbia.....	4			4	9		
Canada.....	(b) 39	4	10	30	97	16	4

(a) Not including artificial abrasive plants which made ferrosilicon as a by-product.

(b) Some firms operate in more than one province.

Table 109.—Principal Statistics of the Primary Iron and Steel Industry, 1940

Years	No. of plants	Capital employed	Average number of employees	Salaries and wages	Cost of fuel and electricity at works	Cost of materials at works	Gross selling value of products at works
		\$		\$	\$	\$	\$
Nova Scotia.....	6	25,847,776	2,579	4,239,079	1,580,973	11,551,402	21,717,799
Quebec.....	14	18,108,891	2,973	4,114,286	1,239,039	4,972,518	13,563,176
Ontario.....	25	87,416,818	11,537	19,877,592	6,466,807	36,340,947	76,335,959
Manitoba.....	4	2,132,547	547	769,630	263,734	1,009,598	2,415,094
Alberta.....	1	338,782	138	206,449	32,238	171,227	566,381
British Columbia.....	4						
Canada.....	54	133,844,814	17,774	29,207,036	9,582,791	54,045,692	114,598,409
Per cent change 1940 from 1939.....		+17.8	+28.5	+43.1	+57.9	+82.4	+50.9

NOTE.—Profits or losses cannot be calculated from above figures as data are not available for general expense items such as interest, rent, depreciation, taxes, insurance, advertising, etc.

Table 110.—Production of Pig Iron and Sales by the Producers, 1939 and 1940

Grades	Delivered in molten condition	Machine cast	Total tonnage made	Sales	
				Quantity	Income from sales
	Long tons	Long tons	Long tons	Long tons	\$
1939					
Basic.....	571,224	84,336	655,560	24,685	552,309
Foundry.....		71,709	71,709	86,738	1,891,656
Malleable.....		28,462	28,462	60,554	1,313,608
Total.....	571,224	184,507	755,731	171,977	3,757,573
1940					
Basic.....	847,558	127,071	974,629	55,032	1,232,426
Foundry.....	99	107,825	107,924	104,243	2,494,054
Malleable.....	213	86,073	86,286	88,324	2,142,289
Total.....	847,870	320,969	1,168,839	247,599	5,868,769

NOTE.—Silvery pig iron has been included with ferro-alloys.

Table 111.—Materials Charged to Iron Blast Furnaces, 1939 and 1940

Materials	Unit of measure	1939		1940	
		Quantity	Cost at furnace	Quantity	Cost at furnace
			\$		\$
Iron ore—Imported (crude).....	long ton	1,272,800	4,582,210	1,953,638	7,325,338
Canadian (beneficiated).....	long ton	45,152	187,010	136,475	558,747
Canadian (crude).....	long ton	.....	.....	1,599	4,957
Mill cinder, roll scale, flue dust, etc.....	long ton	106,834	225,693	116,224	279,271
Scrap (net charge).....	long ton	18,932	192,362	25,617	333,708
Limestone—					
From Canadian quarries.....	short ton	97,946	129,458	125,075	164,977
From foreign sources.....	short ton	259,431	229,194	454,376	470,293
Coke.....	short ton	775,869	4,474,474	1,223,173	7,466,407
Other materials.....	\$	.....	51,996	.....	148,097
Total.....	\$	.....	10,072,402	.....	16,751,795

Table 112.—Blast Furnaces in Canada, 1938-1940

Names of companies	Location of plants	Number of stacks	Total daily capacity (24 hours)	Number of days in blast		
				1938	1939	1940
			(Long tons)			
Dominion Steel and Coal Corporation Ltd.	Sydney, N.S.....	1	350	165	31	357
		1	300	.....	265	354
		1	550	365	365	358
Total.....		3	1,200	.....	.....	.....
Canadian Furnace Company, Limited.....	Port Colborne, Ont.....	1	350	*193	200*	*199
The Steel Company of Canada, Limited...	Hamilton, Ont.....	1	325	365	158	366
		1	650	365	365	330
Total.....		2	975	.....	.....	.....
Algoma Steel Corporation, Limited.....	Sault Ste. Marie, Ont.....	1	300	.....	.....	181
		1	300	.....	.....	.....
		1	450	290	362	316
		1	550	.....	85	366
Total.....		4	1,600	.....	.....	.....
Total for Canada.....		10	4,125	.....	.....	.....

* For making pig iron; ferro-alloys also made in this furnace.

Table 113.—Production of Ferro-Alloys, 1927-1940

Years	Long tons	Years	Long tons
1927.....	56,230	1934.....	31,921
1928.....	44,842	1935.....	56,616
1929.....	89,116	1936.....	76,284
1930.....	65,223	1937.....	82,072
1931.....	46,764	1938.....	55,926
1932.....	16,161	1939.....	76,375
1933.....	30,133	1940.....	133,388

Table 114.—Production of Steel Ingots and Steel Castings, by Grades, 1936-1940
(Long tons)

Years	Steel Ingots		Direct Steel Castings			Total steel castings and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1936.....	1,037,713	43,836	10,208	575	23,447	1,115,779
1937.....	1,274,992	61,236	23,827	1,016	41,811	1,402,882
1938.....	1,047,203	55,891	15,525	759	35,812	1,155,190
1939.....	1,259,231	71,177	15,601	834	38,027	1,384,870
1940.....	1,823,212	121,101	18,826	2,025	47,130	1,012,294

Table 115.—Materials Used in Steel Furnaces, 1940

Materials.	Unit of measure	Quantity	Cost of purchased materials
			\$
(a) Metals—			
Pig iron—Own make	long ton	908,413	
Purchased	long ton	58,721	1,382,107
Scrap iron or steel—Own make	long ton	483,555	
Purchased	long ton	701,722	12,469,326
Spiegeleisen	long ton	3,825	150,838
Ferrovandium	long ton	51	130,566
Ferromanganese	long ton	15,269	1,464,117
Silicomanganese	long ton	1,805	166,286
Ferrosilicon	long ton	8,124	465,831
Ferrochrome, high carbon	long ton	876	114,188
low carbon	long ton	1,066	222,129
Ferromolybdenum	long ton	12	18,950
Ferrophosphorus	long ton	718	66,595
Ferroselenium	long ton	1	1,832
Ferrotitanium	long ton	118	24,233
Ferrotungsten	long ton	336	829,859
Ferrozirconium	long ton	1	93
Other ferro-alloys	long ton	5	14,994
Aluminium ingots	short ton	438	171,850
Copper ingots	short ton	196	45,062
Nickel	short ton	775	459,114
Other metals	short ton		55,042
(b) Ores—			
Ore, iron, crude	long ton	121,985	1,176,064
Ore, iron, calcined, roasted or treated	long ton	7,590	32,563
Ore, manganese	long ton	26	1,300
Ore, chrome	long ton	451	20,503
(c) Other materials—			
Bentonite	short ton	811	24,909
Coal, anthracite	short ton	401	3,801
bituminous	short ton	257	2,302
Coke	short ton	5,523	51,367
Charcoal	short ton	69	2,176
Dolomite, crude	short ton	59,284	123,429
calcined	short ton	21,949	136,360
Fluorspar	short ton	15,307	327,187
Lime	short ton	69,206	413,756
Limestone, Canadian	short ton	43,413	70,581
Imported	short ton	122,562	124,077
Magnesite	short ton	13,673	506,032
Electrodes			307,059
Silica sand	short ton	32,243	235,039
Moulding sand	short ton		
Other foundry sand	short ton		55,978
Firebrick, fireclay and other refractories	short ton		1,099,728
Calcium molybdate and molybdenum oxide briquettes	short ton		216,230
Calcium silicon	short ton	176	48,617
All other materials			1,532,900
Total Value of Metals, Ores and Other Materials Used			24,764,970

Table 116.—Summary of Steel Furnace Capacity in Canada, 1940

Type of furnace	Number of furnaces	Total rated annual capacity
		(Long tons)
Basic open hearth	46	2,215,071
Electric	48	267,931
Converter	3	2,750
Total	97	2,485,752

LITHIUM

The principal commercial lithium ores are amblygonite, a fluophosphate of lithium and aluminium; spodumene, a silicate of these two elements, and lepidolite, or lithia mica, also a silicate. The lithia content of these minerals, as mined, commonly ranges around 8 to 9 per cent for amblygonite, 4 to 7 per cent for spodumene, and 3 to 5 per cent for lepidolite. All of the above

minerals are known to occur in Canada but there has, as yet, been only a small production, mainly of lepidolite and spodumene. The important deposits are all in Manitoba in the southeastern part of the province. The first commercial shipment of Canadian lithium ore to be officially recorded was reported during 1937. This production came from deposits located at Bernic Lake, Manitoba, and was valued at \$1,694; the mineral was consigned to the United States for the manufacture of lithium compounds and possible lithium metal. No commercial shipments of lithium ores from Canadian mines were reported in either 1939 or 1940. Operations were resumed late in 1939 and continued in 1940 at the Bernic Lake lithium deposits of the Lithium Corporation of Canada Limited; and it was reported that commercial shipments of lithium ore might be resumed.

"Metal and Mineral Markets", New York, quoted lithium metal, June, 1941, per pound, 98 to 99 per cent 100 pound lots, \$15. Amblygonite was quoted, June, 1941, per ton f.o.b. mines 8 to 9 per cent Li_2O , \$40. Lepidolite, per ton, \$24 to \$25 for ordinary grades, lump, f.o.b. mines.

Statistics relating to possible imports of lithium, lithium ores or lithium compounds are not shown separately in Canadian trade reports.

MAGNESIUM

No magnesium metal has been commercially produced in Canada during recent years. However, in 1918 the manufacture in the Dominion of metallic magnesium was undertaken by the Shawinigan Electro Metals Company Limited at Shawinigan Falls, Quebec, from imported magnesium chloride salts. It is also stated that during the period 1916-1918, the Consolidated Mining and Smelting Company of Canada, Limited, produced approximately 100 tons of metallic magnesium at Trail, British Columbia, from imported magnesium chloride. This same Company reported that in 1939 the development of an improved process on a semi-commercial scale for the production of magnesium at Trail had been successfully concluded.

In 1940 considerable interest was taken in the possibility of developing Canadian brucite-bearing deposits for their magnesium content and it was reported early in 1941 that such deposits occurring in the lower Gatineau River Valley of the province of Quebec were being investigated by the Bureau of Mines, Ottawa as to their economic importance as a source of magnesium ores. It was later reported that these deposits were expected to come into commercial production in 1941.

Primary magnesium production in the United States during 1940 totalled 12,500,000 pounds, the largest output in the history of the domestic industry, according to the Bureau of Mines, United States Department of the Interior. The 1940 output was 87 per cent above the previous peak of 6,700,000 pounds attained in 1939. The Dow Chemical Company, at present the sole domestic producer of magnesium, expects to produce 30,000,000 pounds of metal in 1941. In February, 1940 the Company doubled capacity of its plant at Midland, Michigan, which utilizes magnesium chloride derived from underground brine and in January, 1941 production was begun at a newly constructed plant at Freeport, Texas, which employs sea water as the raw material.

Since magnesium metal began to play a vital role in the construction of aircraft, attention has been focused upon world production. While official data are not available, it is believed that total world magnesium output did not exceed 45,000 short tons in 1940. The world producers in 1940 in apparent order of importance are Germany, the United Kingdom, the United States, Japan, France, U.S.S.R., Italy and Switzerland. According to sources believed to be reliable, production in Germany, the largest world producer, was between 18,000 and 21,000 tons in 1940. Germany employed carnallite, potash end-liquor, and some magnesite and dolomite as raw material in the production of its magnesium. The electrolytic magnesium chloride process was employed but experiments were recently begun on the direct thermal reduction of magnesium oxide. German uses for magnesium, due to the local lack of certain other metals, include telephone switch parts, optical instruments, microscopes, bus bars and aerial bombs. In the manufacture of engraving plates, copper-zinc alloys have been replaced by magnesium alloys. Automobiles, street-cars, and tanks are understood to offer some of the most important outlets for the present German supply of magnesium alloy.

CONSUMPTION IN THE UNITED STATES OF PRIMARY AND SECONDARY MAGNESIUM IN 1940,
BY USES, IN POUNDS

(United States Bureau of Mines)

Use	Quantity	Use	Quantity
Structural products ¹	7,363,200	Scavenger and deoxidizer.....	361,600
Aluminum alloys.....	3,556,500	Pyrotechnics.....	43,500
Zinc alloys.....	68,000	Chemicals.....	70,200
Other alloys.....	17,600	Other.....	50,400
		Total.....	11,531,000

¹ Castings, sheet, extruded shapes, forgings, etc.

From 7,363,200 pounds of magnesium used in the manufacture of structural products, 5,383,670 pounds emerged in finished items. The remaining 1,979,530 pounds (27 per cent) of the metal consumed by this industry was lost in the manufacturing process. This high loss is due to the fact that magnesium oxidizes readily at temperatures above the melting point. The gross weight of finished structural products was 5,916,120 pounds, of which 5,475,530 pounds were sold or used.

In June, 1941 "Metal and Mineral Markets", New York, stated that tremendously increased requirements for aircraft and other military uses calls for a productive capacity in the United States of about 400,000,000 pounds of magnesium a year by the end of 1942, according to the Office of Production Management. It is expected that negotiations for the construction of new facilities will be carried on by the United States War Department, the Defence Plant Corporation and seven or more companies producing or interested in production of magnesium metal.

Table 117.—Consumption of Magnesium Ingots in Canada, 1939 and 1940

	1939	1940
	(pounds)	(pounds)
In non-ferrous smelters.....	31,990	192,000
In white metal alloy foundries.....	774	7,770
In brass and bronze foundries.....	16	163
In aluminium products.....		240
In ammunition.....		404
In pharmaceuticals.....	200	
Total accounted for.....	32,980	200,577

Imports of magnesium oxide into Canada during 1940 totalled 235,650 pounds valued at \$38,894 compared with 268,813 pounds at \$32,030 in 1939; data relating to imports of magnesium metal into Canada are not published separately. Imports of magnesium alloys into the Dominion in 1940 were appraised at \$1,602.

"Metal and Mineral Markets"—New York—Prices September 21, 1939, and June, 1941, were—per pound ingots (4 x 16 in.) 99·8 per cent; carload lots, 27 cents; extruded sticks, carload lots, 34 cents.

MANGANESE ORE

The Department of Mines and Resources, Ottawa, reports that the manganese ores, which have been mined in Canada are pyrolusite, manganite, psilomelane, and bog manganese. These, with the exception of the bog manganese, were mostly ores with a high manganese content and fairly free from deleterious constituents. They were usually in small lots and were derived from various localities in Nova Scotia, New Brunswick and British Columbia.

Although manganese is used in both the ferrous and non-ferrous metallurgical industries, the bulk is consumed in the manufacture of iron and steel. Most of the ore entering this industry is used in the manufacture of ferromanganese and spiegeleisen, the forms in which manganese is usually added to steel. A considerable quantity of manganese ore is used by producers of storage batteries and certain manganese ores are used by the chemical, ceramic, and glass industries.

A small quantity of manganese ore was produced during 1940 in the Dean and Chapter mines located at New Ross, Lunenburg Co., Nova Scotia. These deposits were worked in 1940 from May 15 to November 30 by the Atlantic Manganese Corporation Limited. In the same province, East Mountain Mining Company extracted and stock piled some high-grade ore from a property near Truro, and in January, 1941 the Company started to erect a reduction plant at Truro to produce metallic manganese by the electro-thermite process. Some recently discovered large bog ore deposits in Cape Breton were prospected in 1940. In New Brunswick, the Sussex Manganese Mining Company Limited reported that prospecting and surface work were conducted during November and December on its property near Sussex. The Company stated that results were encouraging and that it intended to resume operations in 1941. On the Magdalen Islands, Quebec, both surface and underground work on a manganese deposit were carried on in 1940 by the Magdalen Manganese mines; no commercial shipments were made but the Company reported that some 1,200 tons of crude ore were mined; bulk samples from these operations were tested in Ottawa by the Bureau of Mines. In Manitoba, several bog manganese deposits were prospected, mainly in the vicinity of Riding Mountain, near Rossburn and Birtle. During 1940 manganese bearing deposits were also prospected in British Columbia; these were located near Kaslo, Arrowhead and Williams Lake. Samples of manganese ore of varying grade were received in Ottawa from other localities in British Columbia.

Engineering and Mining Journal's "Metal and Mineral Markets"—New York—quoted manganese ore, August 31, 1939, as follows—per long ton unit of manganese, c.i.f. North Atlantic ports, cargo lots, exclusive of duty: Brazilian, 46 to 48 per cent manganese, 27 cents; Chilian, 47 per cent minimum, 27 cents; Indian, 48 to 50 per cent, 28 cents; Caucasian, 52 to 55 per cent, 29 cents; South African, 50 to 52 per cent, 28 cents; 44 to 48 per cent, 24 cents. Prices June, 1941, were: Brazilian, 46 per cent manganese, 65 cents; Chilian, 48 per cent manganese, 70 cents; Indian, 48 to 50 per cent manganese, nominal; South African, 50 to 52 per cent manganese, 70 cents; Cuban, 45 to 47 per cent manganese, not dutiable, 75 cents; 50 to 52 per cent, 80 cents. Prices nominal.

Imports into Canada of manganese oxide during 1940 totalled 140,920,100 pounds valued at \$777,416 compared with 59,573,600 pounds at \$621,931 in 1939. Of the 1940 imports, 131,100,400 pounds came from the Gold Coast and 7,062,800 pounds from the United States.

Table 118.—Production of Manganese Ore in Canada, 1924-1940

Year	Tons	Value	Year	Tons	Value
		\$			\$
1924.....	584	4,088	1936.....	221	1,596
1925-1929.....			1937.....	85	817
1930.....	273	1,356	1938.....		
1931.....	117	2,893	1939.....	396	3,688
1932-1934.....			1940.....	*152	4,315
1935.....	100	800			

* All from Nova Scotia.

The total production of manganese ore in Canada since 1886 totalled 16,529 short tons valued at \$463,013. The largest annual tonnage in those years was 1,801 in 1888 and the greatest annual value was \$89,544 for 957 tons produced in 1916.

Table 119.—Consumption of Manganiferous Ore and Manganese Compounds in Specified Canadian Industries, 1939 and 1940

Industry	Items	1939		1940	
		Quantity	Value	Quantity	Value
			\$		\$
Electrical apparatus and supplies.....	Manganese dioxide.....pound	5,597,349	108,558	6,502,676	197,163
Paints, pigments and varnishes.....	Manganese salts.....pound	52,461	6,017	50,895	7,899
Steel ingots and castings.....	Ore, manganiferous (foreign).....pound	13,016,640	25,252	58,240	1,300
	Spiegeleisen.....long ton	2,790	92,364	3,825	150,838
	Ferromanganese.....long ton	13,961	887,536	15,269	1,464,117

NOTE.—In addition to the consumption recorded in the table above, a considerable quantity of manganiferous ore is employed in the manufacture of ferro-alloys. Also, in 1940, approximately 58 tons of manganese metal was consumed chiefly in the non-ferrous industries.

MERCURY

Canada's production of mercury is principally from a deposit at Pinchi Lake in the Omineca mining division, British Columbia. This property is owned and operated by the Consolidated Mining and Smelting Company of Canada, Ltd. In addition to the recovery of the metal made at Pinchi Lake, there were relatively small quantities recovered in the same province in the Bridge River district by Empire Mercury Mines Limited and by Douglas B. Sterrett at Tunlaw Lake in the Kamloops M.D.

Production of mercury in the United States during 1940 more than doubled under the stimulus of a record-breaking average price for the year, according to the annual summary of the industry by the United States Bureau of Mines. Final figures indicate that 37,777 flasks of mercury were produced in 1940, the largest since 1883. Imports into the United States for consumption amounted to 171 flasks in 1940. Exports of quick silver from the United States in 1940 aggregated 9,617 flasks, of which 5,178 flasks went to the United Kingdom, 1,598 to Japan, 775 to Canada and 666 to Australia. The Engineering & Mining Journal average price for mercury, New York, for 1940 was \$176.865 per flask, against \$103.940 in 1939 and \$75.469 in 1938. The New York price, June, 1941, per flask of 76 pounds was \$184 to \$186.

"The only known deposits of cinnabar in Canada are in British Columbia, by far the most important development being that on the northwest side of Pinchi Lake, Omineca Mining Division, about 40 miles north of Vanderhoof Station on the Canadian National Railway. The deposit was discovered in the summer of 1937 by J. G. Gray of the Geological Survey, Ottawa, and claims were staked in May, 1938, by A. J. Ostram and others. Late in that year they were optioned to Consolidated Mining and Smelting Company. Prospecting disclosed large cinnabar-bearing areas in veins and impregnations mainly in dolomitized and brecciated limestone along zones of fracturing and shearing. A roasting and condensing plant was erected, and production was started in June, 1940. The grade of ore treated is between 0.5 and 0.75 per cent mercury. Prior to the discovery of the Pinchi Lake deposits, little mercury was produced in Canada and their successful operation has brought about a complete change in the Canadian situation in respect to the metal. The output is now far in excess of the domestic requirements and the ore reserves are estimated to be sufficient to assure continuous output at the present rate for several years." (Bureau of Mines, Ottawa).

Canadian Production of mercury comes entirely from British Columbia and in 1940 totalled 153,830 pounds valued at \$369,317 compared with 436 pounds at \$1,226 in 1939.

Table 120.—Consumption of Mercury in Specified Canadian Industries, 1939 and 1940

	1939	1940
	(Pounds)	(Pounds)
Medicinals and pharmaceuticals.....	20,473	30,246
Heavy chemicals (catalyst).....	58,954	30,904
Electrical apparatus.....	2,161	1,899
Non-ferrous smelters.....	867	1,636
Petroleum refineries.....	359	328
White metal refineries.....	500	.....
Gold mines.....	6,313	6,000
Ammunition.....	.....	4,630
Total accounted for.....	89,617	75,643

MOLYBDENITE

Molybdenite ore is the chief source of the metal molybdenum, the mineral, a soft steel-blue coloured sulphide, is usually found in pegmatite dykes and along the contacts of limestone and gneiss. The metal is employed chiefly in the manufacture of special alloy steels.

Canadian mine shipments of molybdenite concentrates totalling 22,251 pounds valued at \$10,280 in 1940 came entirely from the Moss mine, Quyon, Que. and were made by the Quyon Molybdenite Co. Limited. This Company also manufactured molybdenum oxide in 1940. In addition to the operations conducted in 1940 at the Moss mine, development work or exploration on molybdenite deposits was reported by the following operators: Louis Lefebvre in St. Samuel Tp., Frontenac County, Quebec; Cheabella Mine Co., Montbeillard Tp., Quebec; La Pause Gold Mining Corp. Ltd., La Pause, Quebec; La Reine Molybdenum Mines Ltd., La Reine Tp., Abitibi County, Quebec; Norwin Molybdenite Mines Ltd., Eardley Tp., Quebec; Canadian

Molybdenite Mines Ltd., Tory Hill and Essonville, Ont.; Nakina Molybdenite Mines Ltd., Burrows Lake, Ont.; North American Molybdenum Corp. Ltd., Renfrew County, Ont.; Peter Stewart, Cranberry Portage, Manitoba and T. Bentham (Molly claims) Powell River, British Columbia.

Early in 1941 operations by the Quyon Molybdenite Co. ceased at Quyon, Que., and the whole property, including the mine, mill and furnace plant was sold to V. Poulin of St. Lambert, Que. This is the only plant in Canada for the conversion of molybdenite concentrate into suitable addition agents.

Production of molybdenum in the United States, which had increased progressively from 1933 to 1938 again declined in 1940, according to the Bureau of Mines, United States Department of the Interior. Although there was a greatly increased demand by domestic consumers, exports were drastically curtailed, and as a consequence shipments from mines were 22 per cent less than in 1939, which, however, was an all-time high.

About 77 per cent of the United States output of molybdenum came from the operation of the Climax Molybdenum Co. in Lake County, Colo. Production of molybdenum concentrates was also reported from Arizona, California, New Mexico, Utah, and Washington.

Concentrates shipped from United States mines in 1940 were 25,185,000 pounds of molybdenum with an estimated value of \$17,100,000, as compared with 32,415,000 pounds with an estimated value of \$22,157,000 in 1939.

Exports of molybdenum concentrates from the United States in 1940 were 6,339 short tons, of which 2,650 tons went to France, 1,993 to the United Kingdom, 825 tons to Italy, and the remainder (871 tons) to Brazil, Canada, Japan, Mexico, Netherlands, Sweden, and the U.S.S.R.

For most purposes molybdenite (MoS_2) is converted, before using, to ferromolybdenum or to calcium molybdate (a compound resulting from the roasting of molybdenite with lime and containing 35 to 45 per cent molybdenum). The latter, states the United States Bureau of Mines, is the cheaper method of preparing molybdenum for industrial applications. Molybdenum oxide in briquets is also used in making molybdenum additions to iron and steel. Improved processes of heat-treating and fabricating high-speed tool steels in which part of the tungsten has been replaced by molybdenum have increased the use of molybdenum in this field.

The only data published as relating to Canadian imports of molybdenum are those pertaining to calcium molybdate. Calcium molybdate imported into Canada during 1940 by manufacturers of steel for use exclusively in the manufacture of steel in their own factories totalled 461,748 pounds valued at \$333,211 compared with 222,990 pounds worth \$136,321 in 1939. Imports during both years came entirely from the United States. Imports into Canada of alloys used in the manufacture of steel or iron n.o.p. totalled 3,564,100 pounds valued at \$1,277,039 in 1940; some of these may have contained molybdenum.

"Metal and Mineral Markets"—New York—quoted molybdenum ore June, 1941—per pound of contained MoS_2 , 90 per cent concentrate, 45 cents f.o.b. mines; London—per long ton unit, nominal at 45s for 85 to 90 per cent concentrate. Molybdenum per pound, 99 per cent, \$2.60 to \$3.00. Ferromolybdenum per pound of Mo, f.o.b. shipping point, 55 to 65 Mo, 95 cents. Calcium molybdate, per pound of contained Mo, 80 cents.

Table 121.—Production of Molybdenite in Canada, 1925-1940

Year	Ores treated	Ores and concentrates shipped		MoS ₂ content of shipments
	Tons	Tons	Value (a)	Pounds
1925.....	2,779	15.3	\$ 11,176	22,350
1926.....	4,490	12.6	10,472	20,943
1927.....				
1928.....				
1929.....	2,900	9.5	6,400	16,150
1930.....				
1931.....	12	0.61	280	1,222
1932-1936.....				
1937.....	5,307	8.25	8,147	(b)
1938.....	(b)	6.5	4,500	(b)
1939.....	1,492	1.3	816	(b)
1940.....	3,936	11	10,280	(b)

(a) Value given by the operators.

(b) Not known.

RADIUM-URANIUM

The recovery of both radium and uranium in Canada is made in the refinery of Eldorado Gold Mines Limited located at Port Hope, Ontario. Pitchblende concentrates treated in this plant are obtained from the mine of the Company which is situated on Great Bear Lake, Northwest Territories. During the year under review the refinery was in steady production, but operations at the mine were discontinued from June 18 owing to a temporary surplus accumulation of concentrates. Important quantities of silver and some copper also occur with the pitchblende at the Eldorado mine and these metals, in the form of concentrates, are shipped principally to the metallurgical works of other firms for the recovery of the silver and copper content. The total value of radium and uranium products made at the Port Hope refinery in 1940 was \$410,176 compared with \$1,121,553 in 1939.

No radium-uranium mining operations other than those at the Eldorado mine, were reported in 1940.

The 1940 Minerals Year Book of the United States Bureau of Mines reported on radium as follows:

"The agreement between the Union Minière du Haut Katanga of Belgium and Eldorado Gold Mines, Ltd., of Canada, dividing world markets for radium in a 60:40 ratio, is said to have remained in force during 1940. World events, however, virtually eliminated the continent of Europe as a market for radium, and stocks sent to the United States for safekeeping are reported to be more than adequate to meet any anticipated requirements during the next several years. Normal sales for medical purposes in the United States are estimated at less than 25 grams a year. Luminous paints, which are used on instrument dials for airplane and other military equipment, do not require very large quantities, because a little radium goes a long way. One gram, for example, will furnish all the luminous paint needed for several thousand planes. Metal radiography seems to be growing more important and may be used extensively for the examination of castings, forgings, and other metal parts for munitions, but inasmuch as the radium for these purposes can be used repeatedly and can be transported readily from place to place, 5-or 10-gram lots at a few strategic locations could take care of national defense requirements.

"Owing to a sharp decline in world demand for radium and uranium the Canadian producer stopped all operations at Great Bear Lake in June, 1940. Early reports implied that the shutdown might be brief—only long enough for refinery and sales development to catch up with recent increases in ore output—but later advices indicated that the mine might remain closed at least 2 or 3 years. It is stated that the mine is in excellent condition and that ore reserves are ample to keep the concentrator (100-ton daily capacity) in operation for a long time. During the winter of 1939-40 flotation equipment for cleaning pitchblende was flown in by plane, and other additions and changes were made to increase the efficiency of the mill. Refining capacity at Port Hope, Ontario, was expanded before the end of 1939 to 8 grams of radium and 40 tons of uranium compounds a month. It was rumored that stocks of ore and material in process at Port Hope were ample to keep the refinery busy for 3 years or more. Moreover, it was announced that uranium concentrates from the United States had been received for treatment upon a custom basis.

"Although the radium refinery at Oolen, near Antwerp, fell into German hands upon the surrender of Belgium the mines in Belgian Congo did not come under Hitler's control, and the colonial government decided to permit shipments of copper and other metals and mineral products to Great Britain and the United States. Imports into the United States of uranium compounds dropped to 240,199 pounds valued at \$388,355 in 1940 compared with a maximum of 1,439,324 pounds with a value of \$1,197,786 in 1939, whereas imports of "uranium ore", normally negligible (5 pounds valued at \$10 in 1939) jumped to 2,400,198 pounds valued at \$2,110,927 in 1940; all came from Belgian Congo.

"The price of radium advanced slightly to \$30 a milligram early in 1940, then remained unchanged throughout the remainder of the year. Imports aggregated only 30.311 grams valued at \$24,700 a gram in 1940 compared with 78.631 grams valued at \$24,800 a gram in 1939 and 38.75 grams valued at \$20.300 a gram in 1938.

"About 85 per cent of the world radium output is employed for medical purposes, 10 per cent in luminous material, and 5 per cent for miscellaneous uses, including the inspection of metal castings and forgings for inner flaws."

The ceramic industry is the largest user of uranium salts, which are employed for the colouring of ceramics and glass. Considerable interest has recently been taken in the separation from uranium metal of its usual content of one per cent of isotope and in what may be done or perhaps is being done in the utilization of energy obtained in splitting of this atom.

Imports of radium into Canada during 1940 were valued at \$22,360 compared with \$15,929 in 1939; data on Canadian exports are not published.

"Metal and Mineral Markets"—New York—quoted radium May, 1941—per mg. radium content \$25 to \$30, as to quantity. June, 1941, New York quotations for uranium were—black oxide kgs. \$2.55—per pound; yellow kgs. \$1.65—per pound.

SELENIUM

Selenium production in Canada represents a by-product in the electrolytic refining of blister and anode copper made from Saskatchewan, Manitoba, Ontario and Quebec ores. It is recovered at Copper Cliff, Ontario by the International Nickel Company of Canada, Ltd., and at Montreal East, Quebec, by the Canadian Copper Refiners, Ltd. Production in 1940 totalled 179,860 pounds valued at \$343,533.

The Minerals Year Book of the United States Bureau of Mines for 1940 reports on selenium as follows:

"Consumption of selenium in glassmaking, by far the leading use, increased in 1940, and several of the numerous minor applications expanded.

"Both selenium and tellurium are employed to improve the machinability of copper and copper alloys and to a very small extent as modifying agents in corrosion-resistant steels. Additions of selenium have been made successfully to 18/8 steels whose work-hardening properties tend to develop extreme surface hardness as soon as they are cast or otherwise worked, the improvement being similar to that obtained by additions of sulphur and without the deleterious effect of sulphur on corrosion resistance and mechanical strength. Fansteel Metallurgical Corporation (North Chicago, Ill.) has announced a new line of industrial rectifiers employing selenium plates. Suggested applications include supply of current for magnetic clutches, solenoid valves, alarm signal and communication systems, and isolated direct-current motors. The International Telephone Development Co. (New York, N.Y.) is also reported to be using selenium rectifiers."

Consumption of selenium in the manufacture of glass in Canada during 1940 was estimated at 4,532 pounds as compared with 4,243 pounds in 1939. Prices in the United States in 1940 for selenium (black, powdered 99.5 per cent) remained at \$1.75 per pound. Barium selenite (BaSeO_3) was quoted in Glass Industry at \$1.50 to \$1.60 a pound with commercial (25 per cent Se.) at \$0.85 a pound, and sodium selenite (Na_2SeO_3) at \$1.50 to \$1.65 a pound.

General statistics on employment, etc., as relating to the production of both selenium and tellurium are included with those compiled for the Canadian non-ferrous smelting and refining industry.

Complete data pertaining to world production of selenium and tellurium are not available.

Table 122.—Production of Selenium in Canada, 1931-1940

Year	Pounds	\$	Year	Pounds	\$
1931 (a).....	21,500	40,850	1936.....	350,857	621,017
1932.....			1937.....	397,227	687,203
1933.....	48,221	70,345	1938.....	358,929	622,742
1934.....	104,924	171,311	1939.....	150,771	266,714
1935.....	366,425	703,536	1940.....	179,860	343,533

(a) First commercial production in Canada.

TELLURIUM

As with selenium, the metal is recovered in Canada as a by-product in the electrolytic-refining of anode copper at Montreal East, Quebec, by Canadian Copper Refiners, Limited, and at Copper Cliff, Ontario by the International Nickel Company of Canada, Limited. The production

in Ontario represents the recovery of the metal solely from nickel-copper ores; whereas, at Montreal East the metal originated in copper-gold ores mined in Manitoba, Saskatchewan, and Quebec. No commercial production was reported in Quebec.

The United States Bureau of Mines Yearbook for 1940 reported on tellurium as follows:

"Small but steadily growing quantities of tellurium are used to toughen rubber and lead. Tellurium lead has been in service long enough now to confirm by practical tests the claims as to its extraordinary resistance to corrosion, wear, and mechanical break-down, which are all the more remarkable in view of the fact that it differs in composition from ordinary good chemical lead only by an addition of less than 0.1 per cent tellurium. Small additions of tellurium, in this instance about 0.5 per cent, are employed in two new free-machining forgeable alloys of copper recently developed and patented by the Chase Brass & Copper Co. Another new development is to improve the quality and lengthen the useful life of chilled-iron car wheels; this is accomplished by introducing very small quantities of graphite and tellurium in correct proportion and balance into each ladle as the metal is poured. A newly patented "daylight lamp" employs tellurium vapor in a tube to fill in certain wave lengths to produce a continuous spectrum. The price of tellurium remained at \$1.75 per pound in 1940".

In 1940 Canadian steel foundries consumed 400 pounds of tellurium and white metal foundries 629 pounds. Data relating to Canadian imports and exports of tellurium are not published separately in trade reports.

Table 123.—Production of Tellurium in Canada, 1934-1940

Year	Pounds	\$	Year	Pounds	\$
1934 (*).....	5,130	25,599	1938.....	48,237	82,967
1935.....	16,425	32,850	1939.....	2,940	4,769
1936.....	35,591	62,997	1940.....	3,491	5,607
1937.....	41,490	71,777			

(*) First commercial production in Canada.

TIN

Tin is known to occur in the Snowflake and Sullivan mines in British Columbia and in certain pegmatites in southeastern Manitoba. It has also been reported at New Ross, Nova Scotia. No tin ore deposits have been worked or tin ore production recorded in Canada during recent years. No official reports of any primary tin production in Canada were received in 1940 and no development of any Canadian tin bearing deposits was reported.

The only commercial tin ore smelter in the Western Hemisphere in 1940 was in Argentina. In May, 1941 "Metal and Mineral Markets"—Engineering & Mining Journal", New York, reported that the tin processing corporation has awarded a contract for construction of a tin smelter at Texas City, Texas; construction of the plant will commence soon and the project sponsored by the Government will cost \$3,500,000.

Table 124.—Consumption of Tin in Canada by Industries, 1939-1940

	1939	1940
	(Short tons)	
Brass and bronze foundries.....	129	338
White metal foundries.....	1,640	2,021
Steel foundries (chiefly for tin plate).....	810	1,270
Iron foundries.....	52	84
Galvanizing plants.....	.....	90
Jewellery and silverware plants.....	45	49
Electrical apparatus plants.....	34	43
Miscellaneous industries.....	77	82
Total accounted for.....	2,787	3,977

Production of secondary tin in Canadian plants in 1940 was estimated at 86,274 pounds compared with 185,914 pounds in 1939.

TANTALUM-COLUMBIUM

Neither tantalum nor columbium ores are commercially produced in Canada, however, it is interesting to note that the Department of Mines and Resources, Ottawa, reports that columbite-tantalite has been found in small quantities in a number of feldspar mines in the Dominion.

Ferrocolumbium is used in the manufacture of stainless steels and it has been reported that the pure metal may be utilized in the construction of certain vacuum tubes.

Tantalum is strongly resistant to acid corrosion, is weldable and easily fabricated. It is used in chemical process equipment and electronic tubes. Due to its hardness and high melting point, tantalum carbide is a constituent of hard cutting-tool mixtures. Ferrocolumbium has become an important alloy for the manufacture of weldable high-speed steels.

The United States Bureau of Mines Yearbook for 1940 states:

"Both columbium and tantalum are used indirectly in the manufacture of munitions and to a minor extent directly. Total imports of tantalum ores in 1940 jumped to 490,460 pounds compared with only 56,561 in 1939, the previous high record. Owing to collapse of markets in Europe, tantalum ores from Belgian Congo and other African sources, as well as from Brazil, came to the United States during the latter part of 1940. Such ores substantially augmented available supplies of tantalum, but the fact that they contained more columbium than those from Australia is indicated by a decline in the average value of the imports to less than 53 cents a pound from \$1.47 in the preceding year. Imports of columbium ore, including rather small quantities from other countries than Nigeria, which hitherto has furnished virtually all the imports into the United States, advanced to 595,220 pounds, more than five times the quantity imported in 1939 but substantially less than the annual imports during the preceding 4 years. Early in 1941, the Fansteel Metallurgical Corporation, pioneer domestic producer of tantalum metal, was expanding its North Chicago (Ill.) plant at an estimated cost of \$150,000. Vascoloy-Ramet Corporation, Jersey City, N.J., a subsidiary, was also expanding manufacturing facilities, according to press reports.

"Tantalum metal was quoted in the United States throughout the year at \$160.60 (base) a kilogram for C.P. rod and \$143 for sheet, subject to discounts on volume business. Corresponding figures for columbium metal were \$560 a kilogram for rod and \$500 for sheet. Ferrocolumbium, 50 to 55 per cent, was quoted at \$2.25 to \$2.35 a pound of columbium contained (f.o.b. producer's plant)."

Data relating to possible imports of tantalum and columbium metals or ores into Canada are not shown separately in trade reports. *Metal and Mineral Markets*—New York—June, 1941 quoted Columbian Metal—per kilo, base prices: rod \$560; sheet \$500. Tantalum metal per kilo, base price, \$160.60 for C.P. rod. Sheet, \$143. Tantalum ore per pound Ta_2O_5 , \$2.00 to \$2.50 for 60 per cent concentrate, the price depending on source of supply.

TITANIUM

Ilmenite, the titanium ore so largely employed in the manufacture of pigments, is known to occur at several places in Canada and commercial shipments of the mineral have been made during the past years from deposits located at St. Urbain and Ivry in the province of Quebec. During 1939, Canadian production came entirely from St. Urbain, Quebec, and totalled 3,694 short tons valued at \$21,267; the mineral was consigned chiefly to the United States. The Bureau of Mines, Ottawa, reports that the ilmenite deposits of St. Urbain and Ivry carry from 18 to 25 per cent titanium. Rutile occurs in some of the St. Urbain deposits.

The United States Bureau of Mines Yearbook for 1940 states:

"The feature of the titanium industry in 1940 was the phenomenal rise in ocean freight on imported ilmenite. The bulk of the ilmenite consumed in the United States for making pigments and much of that for alloys and miscellaneous uses is imported from British India. A much larger proportion of the domestic consumption of rutile—chiefly for welding-rod coatings and

ceramics—is produced in the United States, and substantial quantities of processed rutile of domestic as well as of foreign origin are exported from this country.

“Although the price of ilmenite f.o.b. Travancore actually declined further during 1940 (average invoice value of imports a long ton: \$3.75 in 1940, \$4.40 in 1939, and \$5.05 in 1938), quotations delivered c.i.f. U. S. Atlantic ports advanced during the summer to \$18 to \$20 a gross ton. Owing to the higher ocean freight and marine insurance, this quotation continued nominal throughout the remainder of the year; it compares with \$10 to \$12 during 1939 and earlier years.

“Imports of ilmenite declined late in the year, whereas consumption probably increased, as it was encouraged not only by the acceleration of general industrial activity but also by the necessity for conserving zinc and perhaps lead, thus speeding further substitution of titanium pigments for competitive materials. Consideration has been given to the wider use of ferrotitanium in steel-making as a means of conserving ferro-manganese. Mention may be made also of Grainal alloys—complex deoxidizers that contain aluminium, titanium and a hardening agent such as vanadium, the titanium functioning to protect and intensify the hardening effect of the vanadium so that less of this more expensive element can be used. As the aluminium and titanium develop fine-grained metal by deoxidization, metal so treated develops a desirable combination of strength and ductility, as well as strength and hardness when quenched and drawn. This treatment is applied chiefly to forging steels containing about 0.4 per cent carbon and 1.8 per cent manganese.

“The high opacity and hiding power of titanium pigments are utilized not alone in paint and decorative coatings but to an increasing extent in paper, rubber, cosmetics, rayon, and other products. In paper-making they can be dispersed in starch, glue, and casein size, and their ready retention in paper pulps permits their addition as beater fillers—improving opacity, color, and brightness with a minimum of loading.”

Imports into Canada of antimony oxide, titanium oxide and white pigments containing not less than 14 per cent by weight of titanium totalled 8,700,015 pounds valued at \$782,957 in 1940 compared with 9,003,693 pounds at \$803,198 in 1939. Of the 1940 imports, 477,912 pounds came from the United Kingdom and 8,292,103 pounds from the United States. No imports into Canada of titanium ore or rutile were recorded in 1940.

Engineering and Mining Journal *Metal and Mineral Markets* New York, quoted titanium ore, June, 1941, per gross ton; ilmenite 54 to 60 per cent TiO_2 , f.o.b. Atlantic seaboard, \$28 to \$30, according to grade and impurities. Rutile per pound, guaranteed minimum 94 per cent concentrate 8 to 10 cents, nominal; 88 to 90 per cent, \$95 per ton c.i.f. New York.

Table 125.—Production of Titanium Ore in Canada (*), 1927-1940

Year	Short ton	\$	Year	Short ton	\$
1927.....	2,029	8,980	1934.....	2,023	14,161
1928.....	2,244	6,732	1935.....	2,288	16,400
1929.....	2,748	7,359	1936.....	2,566	18,318
1930.....	412	1,239	1937.....	4,229	26,432
1931.....	1,509	10,261	1938.....	207	1,449
1932.....			1939.....	3,694	21,267
1933.....			1940.....	4,535	24,510

(*) All from Quebec.

Table 126.—Consumption of Titanium Pigments in Canadian Paint Industry, 1931-1940

Year	Pounds	Cost at works	Year	Pounds	Cost at works
		\$			\$
1931.....	745,207	89,761	1936(*).....	2,456,265	269,130
1932.....	691,304	96,759	1937(*).....	3,748,341	362,869
1933.....	1,061,249	128,969	1938(*).....	3,903,337	378,548
1934.....	1,710,188	186,678	1939(*).....	5,088,234	494,914
1935.....	2,513,026	261,506	1940(*).....	6,136,560	615,945

(*) In 1936 includes 1,396,337 pounds of pure titanium white valued at \$193,638. In 1937 the quantity of pure titanium white totalled 1,299,857 pounds valued at \$193,107; in 1938, 1,341,359 pounds at \$200,552; in 1939, 1,855,288 pounds worth \$275,103 and in 1940, 2,295,248 pounds valued at \$344,545.

NOTE:—Neither titanium white nor titanium alloys are commercially produced in Canada.

In 1940 there were 118 tons of ferrotitanium valued at \$24,233 consumed in the manufacture of steel in Canada.

TUNGSTEN

The Bureau of Mines, Ottawa, states that occurrences of tungsten-bearing minerals, usually in the form of scheelite, are known in Nova Scotia, New Brunswick, Manitoba, British Columbia, and in the Yukon Territory.

In 1939, for the first time in several years, commercial shipments of tungsten concentrates were made from a Canadian mine. These totalled 8,825 pounds valued at \$4,917 and were produced by Columbia Tungstens Company, Limited, at its property located at Wells, Cariboo Mining Division, British Columbia. Only development work was conducted by this Company in 1940. Early in 1940 a shipment of tungsten concentrates was made by the Kirkpatrick Tungsten Syndicate from a deposit at Goff, Halifax County, Nova Scotia. Late in 1939 the tungsten property of the Indian Path Mines, Limited, located near Lunenburg, Nova Scotia, was optioned to Siscoe Gold Mines Limited, who carried out diamond drilling and large scale bulk testing from the underground workings on the east and west ends of the property. Work on this property was discontinued by Siscoe Gold Mines early in 1941. At Upper Lakeville, Halifax County, Nova Scotia, exploration work was conducted by Guysborough Mines Ltd., on the tungsten-bearing deposits of the Lake Charlotte Gold Mines Limited. In Ontario, the Bureau of Mines, Ottawa, recovered tungsten minerals in 1941 from ores shipped from the Hollinger Mine, Timmins, Ontario, and from the Tungsten Queen mine (E. Phillips), Tyaughton Creek, Lillooet M.D., British Columbia.

Tungsten also occurs in the veins of the Slave Lake Gold Mines Ltd., Outpost Island, Slave Lake, Northwest Territories; this property was under development in 1940.

According to the Bureau of Mines, Ottawa, much interest has been aroused in recent discoveries of scheelite in quartz-dionite stringers near Gilmour Lake, about 50 miles east of Yellowknife Settlement in the Northwest Territories. A 200-pound sample sent to Ottawa early in 1941 assayed 8.9 per cent WO_3 .

In Quebec, Manley Gold Mines prospected some scheelite-bearing quartz veins in La Reine township; the mineral also occurs in this province in the ores of the Sullivan, Lamaque, Sigma and Nortrac mines.

Both scheelite and wolframite occur in some of the placer gold gravels in Yukon and the tungsten ore recovered from gold sluicing operations is being set aside for future shipment.

Scheelite also occurs in Ontario in association with gold at the properties of Preston East Dome Mines Limited, South Porcupine; Leitch Gold Mines Limited, Thunder Bay district;

Matachewan Consolidated Mines, Matachewan district, and McKenzie Red Lake Gold Mines Limited, Red Lake.

The principal use for tungsten is in the manufacture of high-speed tool steels. It is also employed in certain non-ferrous alloys and special alloy steels. Tungsten carbide cemented with cobalt is used extensively in industry and recent developments include several special grades, including combinations of tungsten carbide and tantalum carbide cement with cobalt or nickel or both, also combinations of tungsten carbide and titanium carbide cemented with cobalt. Tungsten is also utilized in the making of lamp filaments, radio tube filaments and contact points in electrical apparatus; in the chemical industry it is employed in the manufacture of certain types of dyes (lakes), and mordants.

Stimulated by defence activities, production of tungsten ore and concentrates in the United States in 1940 increased 42 per cent over 1939, according to the Bureau of Mines, United States Department of the Interior. Shipments from domestic mines, which were 24 per cent more than in 1939, were not only the largest since 1917 but have been exceeded in only one other year—1916.

In 1940, 5,319 short tons of concentrated ore (reduced to an equivalent of 60 per cent WO_3) were shipped from United States mines, compared with 4,287 tons in 1939. The reported average value per unit, f.o.b. mines, of the tungsten concentrates shipped increased to \$20.61 in 1940 from \$17.11 in 1939. Shipments of tungsten concentrates were made from Arizona, California, Colorado, Idaho, Missouri, Montana, Nevada, New Mexico, Utah, and Washington in 1940; California replaced Nevada as the largest tungsten producer in 1940.

Production of tungsten concentrates (reduced to an equivalent of 60 per cent WO_3) in the United States, was 5,120 short tons in 1940 compared with 3,603 tons in 1939.

General imports of tungsten ore and concentrates (tungsten content) into the United States in 1940 increased 211 per cent over 1939 and amounted to 9,666,228 pounds.

In addition to the ore and concentrates imported for consumption, 1,348,495 pounds of tungsten in concentrates were imported for smelting, refining and export in 1940 compared with 589,828 pounds in 1939.

Imports of tungsten metal and tungsten carbide into the United States in 1940 were 36,652 pounds (metallic content) compared with 39,498 pounds in 1939. There were no imports of tungstic acid and other compounds of tungsten in 1940.

United States exports of tungsten metal, wire, shapes, and alloys other than ferrotungsten (for which export data are not available) increased to 237,940 pounds in 1940 from 195,002 pounds in 1939.

Table 127.—Imports into Canada of Specified Tungsten Products, 1939-1940

	1939		1940	
	Quantity	\$	Quantity	\$
Tungsten carbide.....		246		988
Chromium metal and tungsten metal (a).....lb.	55,428	50,769	148,184	170,103
Metallic elements and tungstic acid for lamps.....		157,369		157,942

(a) In lumps, powder, scrap alloy, etc., for alloying purposes.

Table 128.—Tungsten Wire Used in the Manufacture of Canadian Electrical Apparatus and Supplies, 1931-1940

Year	Value	Year	Value
	\$		\$
1931.....	79,659	1936.....	47,856
1932.....	53,802	1937.....	52,768
1933.....	48,701	1938.....	50,594
1934.....	48,996	1939.....	52,207
1935.....	52,192	1940.....	62,175

In 1940 there were 336 long tons of ferrotungsten valued at \$829,859 consumed in Canada in the manufacture of steel. Also in 1940 there were 15,474 pounds of tungsten metal used in the manufacture of steel and other alloys (not including tungsten-chromium alloy).

Engineering and Mining Journal *Metal and Mineral Markets*, New York, quoted Tungsten ore June, 1941, as follows: Per short ton, unit of WO_3 : Chinese, duty paid, f.o.b. New York, \$24.00. Bolivian, Portuguese, etc., duty paid, \$24.00, nominal. Domestic scheelite delivered to buyer's plant, \$23.00 to \$24.00, carload lots, on good known analysis; at mines, small lots, several dollars less.

Canadian production of tungsten concentrates in 1940 totalled 12,002 pounds valued at \$7,303 compared with 8,825 pounds worth \$4,917 in 1939. For production by provinces see table 1.

VANADIUM

Some of the magnetites of the Rainy River district in Ontario are known to contain relatively small quantities of vanadium and some research has been conducted as to its economic recovery. There is no production of either the metal or its ores in Canada at the present time.

The principal occurrences of vanadium are in Arizona, Colorado, and Utah in the United States; Minasragra in Peru; Broken Hill in Northern Rhodesia; and Grootfontein district in South West Africa.

The metal is employed chiefly in the manufacture of alloy steels and irons. It is also used in the form of ammonia meta-vanadate as a catalyst in the manufacture of sulphuric acid and in the nonferrous, glass, ceramic and color industries.

Possible imports of vanadium or vanadium ores into Canada are not shown separately in Canadian trade reports. *Metal and Mineral Markets*—New York—quoted ferrovanadium, June, 1941—per pound of vanadium contained, delivered \$2.70 to \$2.90. Vanadium ore per pound V_2O_5 contained, 27½ cents F.O.B. shipping point.

ZIRCONIUM

The metal is not produced in Canada; zircon is the most common zirconium mineral and the Department of Mines and Resources, Ottawa, states that it, or cyrtolite, commonly occurs in greater or less amount in Canadian Precambrian pegmatites, also in the pegmatitic apatite-phlogopite deposits of the Grenville areas in Ontario and Quebec.

Zircon is used to a steadily growing extent in refractories, specialized porcelains and heat-resisting glass. The United States Bureau of Mines Yearbook for 1940 reports on the metal as follows:

"Metallic zirconium is employed as powder or ductile metal in photo-flash bulbs, radio-transmitter tubes, ammunition primers, spot welding electrodes, and a variety of other applications. According to information furnished by the Foote Mineral Co. (1609 Summer St., Philadelphia, Pa.), this metal has a unique combination of high corrosion resistance and ability to absorb large volumes of certain gases. Below 100° C., the metal is immune to attack by some of the most corrosive agents known. At 500° to 860° C. it can absorb great quantities of hydrogen and at higher temperatures oxygen, nitrogen, carbon monoxide, carbon dioxide, and other gases. Zirconium, accordingly, is particularly well suited as a "getter" in vacuum tubes and chemical processes to improve and maintain high vacuum. In steelmaking, zirconium acts as a scavenger and deoxidizer, removing nitrogen and oxygen as well as nonmetallic inclusions. In the range 0.08 to 0.10 per cent zirconium the improvement in grain is marked, and above 0.15 per cent the zirconium combines with sulphur to produce a better surface on high-sulphur steels. Cast nickel-silicon bronze and other non-ferrous alloys may benefit by additions of zirconium.

"An interesting property of zirconium and of titanium metal is that, when drawn across glass or a glazed ceramic surface, they leave a brilliant, silvery, adherent streak. This affords a means of decorating high-grade glassware and pottery without the present necessity of using platinum compounds, followed by a special firing operation.

"Engineering and Mining Journal quotations at the end of 1940 were: Zircon ore, 55 per cent ZrO_2 , f.o.b. Atlantic seaboard, carloads, \$70 a short ton. Zirconium metal, commercially pure, powdered, \$7 a pound. Zirconium alloys, 12 to 15 per cent Zr, 39 to 43 per cent Si, \$102.50 to \$107.50 a gross ton; 35 to 40 per cent Zr, 42 to 52 per cent Si, 14 and 16 cents a pound. These quotations are the same as those in 1939 except for zircon ore and the lower-grade alloy (ferro-silicon zirconium). The former remained at \$55 a ton until the fourth quarter of the year, when it began to advance by \$5 steps to \$70 a ton in early December. The alloy was advanced from \$97.50 to \$102.50, where it had remained for a long time, to \$102.50 to \$107.50 in July".

There was no commercial production of zirconium minerals in Canada in 1940. Canadian imports of zirconium silicate in 1940 were valued at \$12,795 and those of zirconium oxide at \$65,688. Consumption of ferro-zirconium in 1939 in the manufacture of steel in Canada totalled 19 long tons valued at \$2,122.

Table 129.—Principal Statistics (*) of the Miscellaneous Metal Mining Industry in Canada, 1939 and 1940

	1939	1940
Number of firms.....	31	36
Capital employed (a).....	\$ 3,074,999	2,720,642
Number of employees—On salary.....	40	71
On wages.....	291	374
Total.....	331	445
Salaries and wages—Salaries.....	\$ 62,477	113,482
Wages.....	\$ 392,801	514,543
Total.....	\$ 455,278	628,025
Value of production (gross).....	\$ 524,977	2,029,278
Cost of fuel and electricity.....	\$ 92,405	235,861
Process supplies used.....	\$ 81,991	86,797
Smelter charges.....	\$	364,533
Freight.....	\$ 1,177	32,982
Value of production (net).....	\$ 349,404	1,309,105

(*) Does not include data relating to smelters and refineries or to mining in the Northwest Territories.

(a) Exclusive of ore reserves.

Table 130.—Capital Employed in the Miscellaneous Metals Mining Industry in Canada, 1940

	\$
Present cash value of the land (excluding minerals).....	192,235
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,972,853
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	240,372
Inventory value of finished products on hand.....	12,499
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	302,683
Total.....	2,720,642

Table 131.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1940

	Number of employees		Salaries and wages
	Male	Female	\$
Salaried employees—			
Total.....	65	6	113,482
Wage-earners—			
Surface.....	272	}	514,543
Underground.....	47		
Mill.....	55		
Total.....	374		514,543
Grand Total.....	439	6	628,025

Table 132.—Average Number of Wage-Earners Employed, by Months, 1939-1940

	1939	1940		
		Surface	Under-ground	Mill
January.....	144	213	52	31
February.....	143	181	46	26
March.....	166	180	47	17
April.....	190	231	45	31
May.....	226	263	54	53
June.....	289	271	56	63
July.....	310	313	52	70
August.....	377	278	57	82
September.....	376	287	71	92
October.....	394	332	55	88
November.....	425	316	18	76
December.....	415	319	15	34

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

The Non-Ferrous Smelting and Refining Industry, as defined by the Dominion Bureau of Statistics, comprises those firms engaged primarily in the smelting of non-ferrous ores or concentrates and the refining of metals recovered therefrom.

The value added by the industry in the processing of crude or semi-crude material during 1940 totalled \$98,059,287 compared with \$80,057,833 in the preceding year. Refined products included gold, silver, copper, lead, zinc, aluminium, antimony, bismuth, cobalt, cadmium, selenium, tellurium, radium salts, uranium compounds and sulphur; other end products of individual plants or companies were copper-nickel matte, cobalt salts, nickel salts, nickel and cobalt oxides, arsenious oxide, sulphuric acid, platinum metals residues, silver sulphide, zinc dust, zinc oxide, and blister and anode copper.

The cost of ores, concentrates and other material treated during 1940 was estimated at \$174,274,655 as against a corresponding value of \$154,879,498 in 1939; fuels and purchased electricity consumed totalled \$19,510,664 and the value of chemicals and various other process supplies used amounted to \$13,515,941.

Capital employed by the industry in 1940 was reported at \$234,826,742, which figure includes value of land, plant, materials on hand and in process, finished products and operating funds. Employees totalled 13,466 and salaries and wages paid aggregated \$21,766,197 compared with 12,449 and \$19,372,119, respectively, in 1939.

The scientific planning and high efficiency with which the Canadian non-ferrous smelting and refining industry was developed during recent years is now being reflected in the Dominion's great and increasing contribution of refined metals so necessary for the manufacture of war supplies and equipment.

The agreement made in 1939 by the large base metal producers and the Imperial Government, by which the producers were to supply the Imperial Government with copper, lead and zinc at prices which prevailed shortly before the outbreak of the war was continued in 1940. Canada can now furnish large quantities of these metals in the refined form, whereas, in 1914 no refined copper, nickel or zinc and only a comparatively small amount of refined lead were produced in this country.

Table 133.—Principal Statistics of the Non-Ferrous Metallurgical Industry in Canada, 1938, 1939 and 1940

	1938	1939	1940
Number of companies.....	10	9	9
Number of plants.....	13	13	13
Capital employed.....			
Number of salaried employees.....	\$ 184,337,126	192,186,465	234,826,742
Salaries.....	1,063	1,089	1,558
Number of wage-earners.....	\$ 2,612,284	2,670,414	3,661,048
Wages.....	11,725	11,360	11,908
Value of plant products (gross) (†).....	\$ 16,937,679	16,701,705	18,105,149
Estimated cost of ores, concentrates, etc., treated (a).....	\$ 287,295,733	262,602,495	305,360,547
Cost of fuel and purchased electricity (b).....	\$ 173,070,377	154,879,498	174,274,655
Process supplies, other than items (a) and (b).....	\$ 15,233,547	15,891,301	19,510,664
Value added by smelting (net).....	\$ 11,900,435	11,773,863	13,515,941
	\$ 87,091,374	80,057,833	98,059,287

(†) The gross value of production should not be interpreted as the ultimate sale value of finished metal only, as it represents the combined values of all industry (smelting, refining, etc.) end products (blister, copper matte, etc.), and in this sense is a duplication of values.

Table 134.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1940

	\$
Present cash value of the land (excluding minerals).....	6,351,829
Present value of buildings, fixtures, machinery, tools and other equipment.....	146,976,410
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	38,147,747
Inventory value of finished products on hand.....	4,314,785
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	39,035,971
Total	234,826,742

Table 135.—Number of Wage-Earners, by Months, 1932 and 1939-1940

Month	1932	1939	1940
January.....	5,496	11,138	11,225
February.....	5,400	11,123	11,287
March.....	5,355	11,334	11,288
April.....	4,750	11,371	11,403
May.....	4,297	11,380	11,691
June.....	4,475	11,390	11,794
July.....	4,205	11,486	12,102
August.....	4,160	11,476	12,256
September.....	4,193	11,454	12,251
October.....	4,326	11,327	12,316
November.....	4,316	11,401	12,481
December.....	4,274	11,424	12,771
Average	4,604	11,360	11,908

Table 136.—Capacities of Canadian Copper Smelting and Refining Works, 1940 (a)

Company	Blast furnaces		Reverberatories		Converters
	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates	Number
Consolidated Mining & Smelting Co. of Canada Ltd. (b).....			1	75,000	2
Falconbridge Nickel Mines Ltd.....	1	400,000			3
Hudson Bay Mining & Smelting Co. Ltd.....			1	420,000	2
Noranda Mines Ltd.....			2	1,100,000	4
International Nickel Co. of Canada, Ltd.....	4	800,000	7	2,800,000	24

ELECTROLYTIC COPPER REFINERIES	Annual Capacity—short tons
	1940 (a)
Canadian Copper Refiners Ltd.....	112,000
International Nickel Co. of Canada Ltd.....	150,000

(a) American Bureau of Metal Statistics.

(b) Idle.

Table 137.—Lead Smelting Capacity of Canada, 1940

Company	Situation of plant	Number of blast furnaces	Annual capacity (tons of charge)
Consolidated Mining & Smelting Co. of Canada, Ltd.....	Trail, B.C.....	5	700,000

LEAD REFINING CAPACITY IN CANADA, 1940

Company	Annual capacity for refined lead
Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B.C. (electrolytic process).....	200,000 short tons

The lead refining capacity of the world, as at the end of 1939, aggregated about 1,072,000 short tons in the United States and about 2,174,000 elsewhere, a grand total of about 3,246,000 tons.

Probably not more than 950,000 tons of the listed capacity in the United States and 1,550,000 tons elsewhere, a total of 2,500,000 tons, is to be rated as useful and effective, the remainder being obsolete, incapable of economical ore supply, or otherwise useless. These accountings are exclusive of capacity in Russia.

Official data for 1938 were not received from Spain, Germany and Japan, and for 1939 there was an absence of communication for other countries. An estimate of the lead refining capacity of the world outside of North and South America has been becoming increasingly uncertain since the second World War commenced.

Table 138.—Capacity and Production of Electrolytic Zinc Plants in Canada, 1938-1940

Company	Maximum H.P. used	Estimated annual capacity for cathode zinc	Actual production as ingot zinc (short tons)		
		(short tons)	1938	1939	1940
Consolidated Mining & Smelting Co. of Canada Ltd.....	(a) 72,000	(b) 146,000	133,242	(c)	(c)
Hudson Bay Mining & Smelting Co. Ltd.....	22,500	43,000	38,414	38,790	(c)

NOTE.—This statement supplied by the American Bureau of Metal Statistics.

(a) Expressed as power in terms of direct current after transforming the alternating current in sub-station at the works.

(b) Capacity for ingot zinc may be reckoned at 95% capacity for cathode deposition.

(c) Not recorded.

The American Bureau of Metal Statistics estimates the capacity of American zinc metallurgical works at the end of 1939 as being nominally for the production of about 600,000 short tons of spelter per annum by distilling, including the capacity in continuously operating vertical retorts, and about 214,000 tons by electrolysis, a total of about 814,000 tons, but the first-class effective capacity is probably something less than that. The effective capacity outside the United States at the end of 1939 is estimated at about 1,212,000 metric tons whereof about 330,000 tons were in Australia, Canada, Rhodesia and Great Britain.

CHAPTER SEVEN

THE COAL MINING, COKE, NATURAL GAS, PEAT AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA

The Coal Mining Industry in Canada.

The Coke and Gas Industry in Canada.

The Peat Industry in Canada.

The Petroleum Industry in Canada.

1. Production of Crude Petroleum.
2. Production of Petroleum Products.

NOTE:—In order to correlate data regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information regarding these industries as a whole, dealing principally with the mineral industry, although supplementary data are shown for closely allied manufacturing operations.

The Bureau issues an annual report on Coal Statistics for Canada which may be referred to for complete details of the Coal Mining Industry.

THE COAL MINING INDUSTRY

Canadian mines produced 17,566,884 tons of coal valued at \$54,675,844 during 1940; in the preceding year, 15,692,698 tons worth \$48,676,990 were produced, while in 1938 the output totalled 14,294,718 tons worth \$43,982,171. Bituminous coal output during 1940 amounted to 13,333,037 tons, sub-bituminous 598,686 tons, and lignite coal 3,635,161 tons. Nova Scotia's coal output rose 11 per cent in 1940 over 1939 to 7,848,921 tons. Production from New Brunswick mines was 17 per cent higher at 547,064 tons. Manitoba produced 1,697 tons in 1940 as against 1,138 in 1939. Production from Saskatchewan mines totalled 1,097,517 tons, 14 per cent over the previous year's total of 960,000 tons. Alberta's production aggregated 6,203,839 tons, made up of 3,069,206 tons of bituminous coal, 598,686 tons of sub-bituminous coal and 2,535,947 tons of lignite coal. In 1939, Alberta mines produced 5,519,208 tons, consisting of 2,556,944 tons of bituminous coal, 512,101 tons of sub-bituminous coal and 2,450,163 tons of lignite coal. British Columbia's output rose 10 per cent to 1,867,846 tons from 1,692,755 tons. No coal was produced in the Yukon during the year under review. The last year for which any production was recorded was in 1938 when the output was 361 tons.

Canadian coal exported in 1940 amounted to 504,898 tons; this represented an increase of 34.2 per cent over the tonnage exported a year ago. Ports in Nova Scotia, New Brunswick and Quebec cleared 310,495 tons of Canadian coal in 1940; exportations through the western ports totalled 194,403 tons. Canada re-exported foreign coal in 1940 to a total of 55,584 tons compared with 119,487 tons in 1939.

Imports of coal into Canada in 1940 were higher at 17,546,060 tons. Anthracite coal importations during the year amounted to 3,964,862 tons and consisted of 2,643,588 tons from the United States and 1,321,274 tons from Great Britain. The United States supplied 66.7 per cent of the Canadian anthracite requirements in 1940 compared with 65.5 per cent in the preceding year and 48.4 per cent in 1935. Great Britain supplied 33.3 per cent of Canada's requirements of this coal during the year 1940, as against 26 per cent in 1939 and 42.1 per cent in 1935. Receipts of bituminous coal totalled 13,578,705 tons or 37.1 per cent above the 1939 total. Lignite coal imports amounted to 2,493 tons in 1940.

Employment was furnished by Canadian coal mines to 26,434 people, of whom 25,128 were wage-earners and 1,306 were salaried employees. Mines in Nova Scotia and New Brunswick employed 14,355 wage-earners, while those in the western provinces employed 10,773. Surface workers averaged 276 days work in 1940 and underground workers 245 days. All employees working in and about Canadian coal mines received salaries and wages totalling \$34,043,162 compared with \$30,720,991 in 1939.

Coal made available for consumption in Canada during the year amounted to 34,608,046 tons or 18 per cent above the tonnage made available in 1939. These figures do not represent the

quantity consumed during the year but are the actual tonnages of new coal made available for use in 1940. It was estimated that 33,702,324 tons of coal reached the Canadian market during the year. In addition to coal consumption, there has been an increase in the development of other fuels, such as coke, natural and artificial gas, fuel oil and electricity used for industrial purposes. In addition, wood still occupies a prominent place in Canada's fuel requirements.

Table 139.—Capital Employed in the Coal Mines of Canada, by Provinces, 1939 and 1940

Province	1939				1940			
	Capital employed as represented by:				Capital employed as represented by:			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading, and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading, and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	33,216,566	3,453,405	8,151,120	44,821,091	31,933,400	2,746,740	8,035,399	42,715,539
New Brunswick...	776,612	37,874	392,420	1,206,906	932,347	36,360	494,612	1,463,319
Manitoba.....	3,000	100	500	3,600	2,500	100	500	3,100
Saskatchewan.....	3,748,459	130,660	381,928	4,261,047	2,982,291	84,716	331,592	3,398,599
Alberta.....	29,811,382	821,006	6,333,786	36,966,174	27,257,731	863,425	6,265,591	34,386,747
British Columbia..	19,492,252	244,763	2,076,651	21,813,666	19,549,183	379,169	1,739,234	21,667,586
Yukon.....								
Canada.....	87,048,271	4,687,808	17,336,405	109,072,484	82,657,452	4,110,510	16,866,928	103,634,890

Table 140.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1940

Provinces	Average number of employees				Salaries and wages			
	Salaried employees		Wage-earners		Total	Salaries	Wages	Total
	Male	Female	Surface	Under-ground				
						\$	\$	\$
Nova Scotia.....	444	55	2,067	10,882	13,448	954,341	16,888,577	17,842,918
New Brunswick.....	43	9	360	1,046	1,458	90,130	1,223,177	1,313,307
Manitoba.....			1	3	4		1,876	1,876
Saskatchewan.....	41	4	247	402	694	95,018	542,338	637,356
Alberta.....	486	29	1,860	5,477	7,852	1,131,390	9,151,353	10,282,743
British Columbia.....	184	11	734	2,049	2,978	417,740	3,547,222	3,964,962
Yukon.....								
Canada.....	1,198	108	5,269	19,859	26,434	2,688,619	31,354,543	34,043,162

Table 141.—Wage-earners Employed and Days' Work Done, by Months, in the Coal Mines of Canada, 1940, with Comparative Totals for 1939

Month	Number of wage-earners			Days' work done		
	Surface	Under-ground	Total	Surface	Under-ground	Total
January.....	5,674	21,594	27,268	134,890	447,321	582,211
February.....	5,586	21,073	26,659	122,543	399,036	521,579
March.....	5,324	19,973	25,297	116,075	372,346	488,421
April.....	5,003	18,536	23,539	109,476	366,663	476,139
May.....	4,894	18,018	22,912	112,451	376,084	488,535
June.....	4,923	17,800	22,723	107,125	348,057	455,182
July.....	4,865	17,753	22,623	111,541	374,149	485,690
August.....	5,114	19,002	24,116	119,985	410,900	530,885
September.....	5,206	20,039	25,245	116,019	392,765	508,784
October.....	5,516	21,145	26,661	140,320	463,251	603,571
November.....	5,620	21,800	27,420	137,470	486,011	623,481
December.....	5,504	21,565	27,069	128,091	437,815	565,906
Total for 1940.....				1,455,986	4,874,398	6,330,384
Total for 1939.....				1,371,687	4,367,008	5,738,695

Table 142.—Output of Coal in Canada, by Grades, 1931-1940

Calendar year	Bituminous		Sub-Bituminous		Lignite		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$		\$
1931.....	8,861,360	33,165,730	471,343	1,211,197	2,910,508	6,830,755	12,243,211	41,207,682
1932.....	7,714,279	28,073,744	560,902	1,329,316	3,463,732	7,714,635	11,738,913	37,117,695
1933.....	7,979,283	27,757,150	554,118	1,274,017	3,369,943	6,892,795	11,903,344	35,923,962
1934.....	10,058,782	34,356,274	537,508	1,256,936	3,213,903	6,432,732	13,810,193	42,045,942
1935.....	9,748,841	33,150,781	566,425	1,410,926	3,572,740	7,401,403	13,888,006	41,963,110
1936.....	10,796,135	36,256,347	566,235	1,432,741	3,866,812	8,102,846	15,229,182	45,791,934
1937.....	11,634,379	39,661,259	506,260	1,314,196	3,695,315	7,776,593	15,835,954	48,752,048
1938.....	10,329,782	35,403,781	488,915	1,269,131	3,476,021	7,309,259	14,294,718	43,982,171
1939.....	11,769,296	40,119,905	512,101	1,323,401	3,411,301	7,233,684	15,692,698	48,676,990
1940.....	13,333,037	45,350,950	598,686	1,569,771	3,635,161	7,755,123	17,566,884	54,675,844

Table 143.—Output and Value of Coal in Canada, by Kinds and by Provinces 1939 and 1940

(Short tons)

Province	1939			1940		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	40	7,051,176	25,611,271	42	7,848,921	28,766,195
NEW BRUNSWICK (Bituminous).....	34	468,421	1,566,359	33	547,064	1,961,863
MANITOBA (Lignite).....	1	1,138	3,110	1	1,697	4,037
SASKATCHEWAN (Lignite).....	*136	960,000	1,255,862	110	1,097,517	1,408,540
ALBERTA—						
Bituminous.....	18	2,553,944	7,117,168	17	3,069,206	8,465,642
Sub-bituminous.....	19	512,101	1,323,401	18	598,686	1,569,771
Lignite.....	238	2,450,163	5,974,712	226	2,535,947	6,342,546
Total.....	†275	5,519,208	14,415,281	261	6,203,839	16,377,959
BRITISH COLUMBIA (Bituminous).....	24	1,692,755	5,825,107	22	1,867,846	6,157,250
YUKON (Bituminous).....						
CANADA—						
Bituminous.....	116	11,769,296	40,119,905	114	13,333,037	45,350,950
Sub-bituminous.....	19	512,101	1,323,401	18	598,686	1,569,771
Lignite.....	375	3,411,301	7,233,684	337	3,635,161	7,755,123
Total.....	510	15,692,698	48,676,990	469	17,566,884	54,675,844

* Exclusive of 35 small mines in operation during part of 1939 and 30 small mines operating during part of 1940.

† Exclusive of 30 small mines operated under special permits in 1939 and 28 small mines in 1940.

THE COKE AND ARTIFICIAL GAS INDUSTRY

Production from coke plants and from illuminating and fuel gas plants in Canada during 1940 was valued at \$46,673,660. This output was 19 per cent above the \$39,029,570 of the previous year and set a new record for the industry. Output for the year under review included 3,015,394 tons of coke valued at \$21,937,861 at the works, 55,112,521 M cubic feet of gas of which 55,105,172 M cubic feet valued at \$20,650,469 were sold or used, and by-products valued at \$4,085,330.

Twenty-eight coke and gas works operated in 1940, including 10 by-product and bee-hive plants and 18 retort coal and water gas plants. Fourteen of these works were located in Ontario, 4 in British Columbia, 4 in Quebec, 2 in Manitoba, 2 in Nova Scotia, and 1 in each of New Brunswick and Alberta. In addition to these producers, 1 company in Quebec and 2 in Ontario purchased coke-oven gas and distributed it for domestic or commercial use and data covering their operations have been included to round out the figures for the industry.

Output of coke from gas retorts, by-product and bee-hive ovens totalled 3,015,394 tons in 1940 compared with 2,410, 095 tons in 1939 and 2,352,003 tons in 1938. By-product and bee-hive ovens produced, 2,725,873 tons of coke in 1940 and gas retorts made 289,521 tons. In addition, 68,334 tons of petroleum coke were recovered in petroleum refineries.

Data on the distribution of coke (except petroleum coke) by the producers show that 246,816 tons were sold direct to domestic consumers, 1,238,710 tons were used in metallurgical works operated by the producing companies, 222,877 tons were used by coke plants as fuel or to make water gas, 507,627 tons were sold direct to consumers for foundry and other uses (other than domestic), 800,816 tons were sold to dealers for resale, and 36,556 tons were sold for export. The total distribution was 3,053,402 tons, including about 22,000 tons withdrawn from producers' stocks during the year. Total stocks of coke in the hands of producers amounted to 289,416 tons at the end of 1940.

Imports of coke made from coal advanced to 719,338 tons in 1940 from 435,871 tons in 1939, but exports declined to 37,535 tons from 48,719 tons. Imports of petroleum coke during this period rose to 185,334 tons from 147,690 tons and exports (including re-exports of imported coke) advanced to 40,433 tons from 35,604 tons.

Manufactured gas, sold and used, amounted to 55,105,172 M cubic feet in 1940, including 45,019,439 M cubic feet from by-product ovens and 10,085,733 M cubic feet from gas plants. Sales of gas by the producers totalled 15,392,723 M cubic feet, of which 8,744,090 M cubic feet were from by-product ovens and 6,648,633 M cubic feet were from gas works. Most of the remaining gas was used as a fuel in the producing plants or in their associated metallurgical works. These figures do not include 41,055 M cubic feet of (Pintsch) oil gas for lighting railway cars, 8,706,834 M cubic feet of still gas recovered at petroleum refineries, nor iron blast furnace gas and some producer gas which was recovered and used by the producers but for which no records are available.

The number of customers served with manufactured illuminating and fuel gas in 1940 was 483,820, the number of active meters was 506,250, the length of distributing mains was 4,062 miles, and the average calorific value of the gas sold ranged from 450 to 570 B.T.U. per cubic foot.

Table 144.—Materials Used in Coke and Gas Plants, in Canada, 1939 and 1940

Materials	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Bituminous coal carbonized in ovens or retorts—					
(a) Canadian.....	short ton	1,073,978	4,592,536	1,418,671	6,048,615
(b) Imported.....	short ton	2,194,348	10,672,863	2,699,579	13,295,700
Bituminous coal for making water gas—					
Imported.....	short ton	2,882	21,449	2,699	20,691
Coke for gas-making—					
(a) Purchased.....	short ton	6,339	53,483	7,334	71,921
(b) Companies' own make.....	short ton	79,953	530,179	77,984	532,257
Oil used for enriching water gas.....	Imp. gal.	4,028,892	299,033	4,229,239	282,041
Absorbing and wash oil.....	Imp. gal.	201,602	21,777	220,038	27,743
Caustic soda.....	pound	720,632	10,866	1,500,655	31,184
Lime.....	ton	2,168	£1,592	2,608	27,339
Water.....			14,848		20,917
Iron oxide.....	ton		35,417	5,417	42,491
Sulphuric acid, 66° Bé.....	pound	45,729,750	320,002	61,483,735	432,618
All other materials.....			132,000		203,812
Total cost.....			16,726,445		21,037,329

Table 145.—Production in Canada, Imports and Exports of Coke and Its By-Products, 1939 and 1940

	1939		1940	
	Quantity	Value	Quantity	Value
Coke				
		\$		\$
PRODUCTION—by provinces—				
Nova Scotia, New Brunswick and Quebec..... tons	802,072	5,583,317	1,040,999	7,582,337
Ontario..... tons	1,379,942	9,712,164	1,732,303	12,842,138
Manitoba, Alberta and British Columbia..... tons	228,081	1,468,036	242,092	1,513,386
Total..... tons	2,410,095	16,763,517	3,015,394	21,937,861
IMPORTS..... tons	435,871		719,338	
EXPORTS..... tons	48,114	315,699	35,523	231,918
AVAILABLE FOR CONSUMPTION..... tons	2,797,852		3,699,209	
Other Products				
PRODUCTION—				
Ammonium sulphate..... tons	28,664	683,977	35,493	952,014
Gas: Sales..... M cu. ft.	14,936,102	14,562,246	15,392,723	14,803,049
Used in own plants..... M cu. ft.	15,732,194	2,206,196	22,877,703	2,865,974
Used in associated metallurgical works..... M cu. ft.	9,377,343	1,204,936	13,185,237	1,629,944
Gas otherwise accounted for, but not sold..... M cu. ft.	231,514	74,625	2,128,931	101,301
Not accounted for..... M cu. ft.	1,339,570	1,112,897	1,520,578	1,250,201
Benzol..... imp. gal.	2,813,014	417,146	5,614,458	715,981
Toluol and xylol..... imp. gal.	3,810,145	472,662	2,301,370	634,631
Other light oils..... imp. gal.				
Tar..... imp. gal.	27,077,070	1,515,071	32,817,895	1,762,324
Ammonia liquor..... pound N.H. ₃		16,297		20,380
IMPORTS—				
Ammonium sulphate..... tons	3,217	94,854	355	13,506
Coal tar and pitch.....		296,554		164,132
EXPORTS—				
Ammonium sulphate..... tons	109,260	2,508,364	72,485	2,172,049
Coal tar and pitch..... gal.	1,875,385	101,255	406,597	37,088

THE NATURAL GAS INDUSTRY

Output of natural gas in Canada in 1940 totalled 41,232,125 thousand cubic feet or 17 per cent above the 1939 total. This production includes only the natural gas consumed for industrial and domestic purposes and does not take into account the waste gas burned in the Turner Valley field and the gas piped to the Bow Island field for re-pressuring.

Wells in New Brunswick produced 616,041 thousand cubic feet compared with 606,382 thousand cubic feet in 1939. Approximately 6,100 consumers in Moncton and Hillsborough were supplied with gas from wells in the Stoney Creek field, near Moncton. There were 42 wells in operation in this province at the end of 1940.

Ontario's output rose 9 per cent to 13,053,403 thousand cubic feet from the 1939 production of 11,966,581 thousand cubic feet. Developments in this province in 1940 were summarized by Mr. A. R. Crozier, Acting Commissioner of Gas for Ontario as follows:

"Each month during the year there was a steady increase in industrial consumption, which was only brought under control late in November by the enactment of a regulation restricting the installation of gas-fired heating and processing equipment. Most of the industrial expansion reflects the part being played by Ontario's many industries in the production of munitions and materials of war. The industrial consumption for the year 1940 was 2,792,556 M cubic feet, an increase of 288,602 M cubic feet over the previous year.

"During the year, domestic consumption and the number of consumers showed a considerable increase over previous years. The normal annual increase, in past years, has been from 3,000 to 4,000 new consumers, whereas for this year it exceeded 5,000. The domestic consumption for

the year was approximately one billion cubic feet greater than in 1939. This additional consumption of natural gas throughout southwestern Ontario may be accounted for by the influx of workers to areas where many essential war industries are located. With the increased use of natural gas there inevitably followed an ever expanding demand for equipment, both new and used. In order to meet this unprecedented situation and prevent shortage and ensuing hardship, regulations were enacted to control the use of gas.

"Drilling operations slackened slightly during the year; only 311 wells were completed as compared to 346 in the previous year. Of the total number of wells completed, 233 were drilled in the search for natural gas and 78 for petroleum. The number of producing wells, however, was approximately the same as in previous years, indicating that the favourable areas are becoming more restricted. Along with the more or less discouraging drilling results, the independent drilling operators encountered difficulties in financing, owing to the uncertainties existing during wartime. On the other hand, the larger natural gas companies put forth greater efforts in an attempt to develop new or additional supplies of natural gas to meet the ever increasing domestic and industrial demand.

Purification Plants

"With the development of the Malahide gas field in Malahide township, there followed the construction of two independently operated purification plants; one owned and operated by the Union Gas Company of Canada, Limited, and the other by the Central Pipe Line Company, Limited. The former plant has a capacity of approximately 15,000 M cubic feet per day, and the latter, 5,000 M cubic feet per day. At each plant impure natural gas containing hydrogen sulphide (H_2S) is passed through a lime solution, which removes the hydrogen sulphide. Owing to considerably reduced capital investment and simplicity of operation, the "lime solution" method of purifying natural gas has in recent years taken the place of the "potash method". The "lime solution" method has proved to be very satisfactory and except for the disposal of the poisonous water from the lime tanks, is generally accepted as the more economical method of purifying impure natural gas.

Natural Gas Fields

"Possibly no single factor in many years has been more disturbing to the natural gas operator and industry than the sudden failure of the Brownsville gas field in Dereham township. Early in the spring of 1940 the production of this field dropped off very sharply, and by the end of the year many wells were plugged and abandoned, thus creating a shortage of natural gas in those towns and cities dependent on this area as their main supply. The possibility of rejuvenating this field, or of extending the producing area, does not appear to hold much promise at the present time.

"There was little change during the year in the Tilbury field other than a normal decline in rock pressure and open flow measurements. Over the greater part of the field compressors were in general use, which greatly increased the daily peak production of this field. Lake drilling commenced again, and one producing well was completed in Lake Erie, opposite lot 187, Romney township; it is anticipated that further drilling in Lake Erie will be carried out during the coming year in the hope of developing additional quantities of gas.

"The Declute field in Raleigh township produced considerable quantities of gas until late in the year when edge-water encroached at the eastern end of the field, with the result that the production declined rapidly. By the end of the year both the rock pressure and open flow measurements showed a serious decline.

"In the Dawn field the production was slightly greater than in the previous year. The open flow stood up much better than in 1939 while the rock pressure showed a greater drop than in the period 1938-39. Owing to the increased consumption in the City of London, there was a very heavy pull on the field until the latter part of the year when the wells of the Malahide field were placed on the line. The production of the Dawn field for the year 1940 was 2,276,346 M cubic feet, which was slightly greater than in the previous year.

"The Haldimand field continued to produce natural gas at approximately the same rate as during 1939 and, other than a normal decline in rock pressure, showed little change from former years. The number of operating gas wells was 1,601, only one less than for the previous year.

"The Chatham gas field, which was discovered late in 1936 by the Union Gas Company of Canada, Limited, was for the first time placed in production near the end of the year. Many of the first wells to be completed were dry. By the end of the year, however, there were 12 producing gas wells with a total open flow of approximately 5,000 M cubic feet.

"An extensive exploratory drilling program was undertaken in Malahide township in 1938, which resulted in the discovery in 1939 of what is known as the Malahide gas field, concessions IV and V, lots 4 to 31 inclusive. At the end of 1940, there were 53 producing wells with a total open flow of 70 million cubic feet. As in the Brownsville field, a few miles to the north, the natural gas contains small quantities of hydrogen sulphide, making necessary the erection of purification plants before the gas can be distributed for either domestic or industrial consumption. In December, the City of London was being supplied with purified gas from the Malahide field.

"Although in the Welland field the number of producing wells decreased by 25, the production dropped off by 12 million cubic feet. On the other hand, it must be remembered that this field has been producing for well over 50 years and it is only to be expected that the productive capacity will show a slow but steady decline.

There were 208 operating, distributing and drilling firms active in the natural gas industry in Ontario during 1940. These firms reported a total capital investment of \$5,652,374; employment was furnished by this industry to 1,542 salaried employees and wage-earners.

Saskatchewan produced 100,773 thousand cubic feet of natural gas in 1940 compared with 96,423 thousand cubic feet in the preceding year. The 1940 output was used principally to supply customers in Lloydminster.

Natural gas production in Alberta totalled 27,459,808 thousand cubic feet in 1940 as compared with 22,513,660 thousand cubic feet in the preceding year. As stated before, these figures include only the natural gas consumed for industrial and domestic purposes and do not take into account the waste gas burned in the Turner Valley field and the gas piped to the Bow Island field for storage.

The Turner Valley field is the largest natural gas producing area in Canada; this field is located about 35 miles southwest of Calgary. Industrial and domestic users consumed 20,448,402 thousand cubic feet of Turner Valley gas in 1940; in the previous year, 15,693,314 thousand cubic feet were used. Approximately 25,000 consumers in Calgary, Lethbridge and the districts were served with this gas in 1940; in addition, a considerable quantity was used in the field for drilling purposes. A small quantity of Turner Valley gas was piped to the Bow Island field during the year for re-pressuring wells in that area.

Approximately 2,600 customers in the city of Medicine Hat were supplied with gas from the Medicine Hat field. The total consumption of gas in this city was 2,325,176 thousand cubic feet as against 2,127,802 thousand cubic feet in 1939. The Redcliffe field supplied 282 industrial and domestic users with 636,408 thousand cubic feet of gas in 1940. The Redcliffe field is located about two miles west of Medicine Hat.

Edmonton obtains its principal supply of gas from the Viking field, which is situated about 80 miles southeast of the city. In 1940 gas was supplied by this field to 12,000 consumers in Edmonton and 500 users outside the city. Twenty wells were in operation in the Viking field during the year.

In Alberta, on December 31, 1940, there were 95 wells producing natural gas only compared with 96 wells a year ago. Capital employed by the companies operating in this industry in Alberta during the year was \$26,967,881 as compared with \$26,544,265 in 1939. The industry employed 540 persons who received salaries and wages totalling \$789,818. The cost of fuel and electricity used during the year was \$8,096.

It was estimated that at Fort Norman, in the Northwest Territories, 1,500 thousand cubic feet of natural gas were used for power purposes.

Canada imported 130,342 thousand cubic feet of mixed gas (natural and artificial) by pipe line from the United States in 1940. This gas was valued at \$91,976. In 1939, imports totalled 114,396 thousand cubic feet valued at \$75,380.

Table 146.—Production of Natural Gas in Canada, by Provinces, 1931-1940

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1931.....	655,891	323,184	7,419,534	4,635,497	600	180	17,798,698	4,067,893	25,874,723	9,026,754
1932.....	662,452	326,191	7,386,154	4,719,297	600	180	15,370,968	3,853,794	23,420,174	8,899,462
1933.....	618,083	302,706	7,106,659	4,523,085	600	180	15,352,811	3,889,263	23,138,103	8,712,234
1934.....	623,601	306,005	7,682,851	4,741,368	600	180	14,841,491	3,707,276	(a)23,162,324	(a)8,759,652
1935.....	615,454	303,886	8,158,825	4,938,084	600	180	16,090,349	4,113,436	(b)24,910,786	(b)9,363,141
1936.....	606,246	298,819	10,006,743	6,052,294	600	180	17,407,820	4,376,720	(c)28,113,348	(c)10,762,243
1937.....	576,671	283,922	10,746,334	6,588,798	600	180	20,955,506	4,766,437	(d)32,380,991	(d)11,674,802
1938.....	577,492	284,689	10,952,806	6,430,764	600	180	21,822,108	4,807,346	(e)33,444,791	(e)11,537,450
1939.....	606,382	292,403	11,966,581	7,261,928	600	180	22,513,680	4,915,821	(f)35,185,146	(f)12,507,307
1940.....	616,041	300,543	13,053,403	7,745,834	600	180	27,459,808	4,923,469	(g)41,232,125	(g)13,000,593

(a) Includes production in Saskatchewan of 13,781 M cu. ft. at \$4,823.

(b) Includes production in Saskatchewan of 75,558 M cu. ft. at \$7,555.

(c) Includes production in Saskatchewan of 90,839 M cu. ft. at \$33,985 and in the Northwest Territories of 1,100 M cu. ft. at \$245.

(d) Includes production in Saskatchewan of 100,380 M cu. ft. at \$35,130 and in the Northwest Territories of 1,500 M cu. ft. at \$335.

(e) Includes production in Saskatchewan of 90,285 M cu. ft. at \$34,136 and in the Northwest Territories of 1,500 M cu. ft. at \$335.

(f) Includes 96,423 M cu. ft. at \$36,640 in Saskatchewan and 1,500 M cu. ft. at \$335 for Northwest Territories.

(g) Includes 100,773 M cu. ft. at \$30,232 in Saskatchewan and 1,500 M cu. ft. at \$335 in Northwest Territories.

Table 147.—Production of Natural Gas in Canada, by Months, 1940

	New Brunswick	Ontario	(a) Manitoba	Saskatchewan	Alberta	Canada
	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.
January.....	71,185	1,730,177	50	17,704	3,485,847	5,304,963
February.....	71,358	1,579,351	50	13,270	3,066,065	4,730,094
March.....	64,050	1,508,733	50	12,104	2,717,257	4,302,194
April.....	62,193	1,258,643	50	8,603	2,297,109	3,626,598
May.....	55,039	905,366	50	3,272	1,704,056	2,667,783
June.....	41,885	614,294	50	3,512	1,447,711	2,167,452
July.....	29,553	549,816	50	2,744	1,494,852	(b)2,077,515
August.....	25,319	530,219	50	2,407	1,464,604	(b)2,033,099
September.....	30,624	654,629	50	2,407	1,534,648	(b)2,222,858
October.....	40,351	902,348	50	6,970	2,034,120	(b)2,983,839
November.....	58,481	1,268,786	50	14,641	2,994,311	4,336,269
December.....	66,003	1,551,041	50	13,139	3,219,228	4,849,461
Total.....	616,041	13,053,403	600	100,773	27,459,808	41,232,125

(a) Estimated.

(b) Includes production from Fort Norman, Northwest Territories.

Table 148.—Natural Gas Production in Ontario, by Fields, 1939 and 1940 (a)

County	Field	1939	1940
		M cu. ft.	
Essex.....	Kingsville.....	3,097,557	2,902,079
Kent.....	Tilbury.....	2,182,437	2,717,192
	Declute.....		
Lambton.....	Dover.....	433,496	351,837
	Dawn and Oil Springs.....	2,148,472	2,276,346
Middlesex.....	Mosa.....		21,444
Oxford.....	Brownsville Field/Dereham...	842,511	809,745
Elgin.....	Bayham.....	267,129	226,515
Elgin.....	Bayham.....	59,554	81,356
	Malahide.....		608,860
Norfolk.....	Norfolk.....	362,780	432,510
Lincoln.....	Lincoln.....	2,109,935	2,101,759
Haldimand.....	Haldimand.....		
Wentworth.....	Wentworth.....		
Brant.....	Onondaga.....	108,640	151,193
Welland.....	Welland.....	279,696	267,567
Prince Edward.....	Hallowell.....	374	1,000
Wells in surface drift.....	Howard and Harwich.....	14,000	14,000
Private wells.....		60,000	60,000
Total produced.....		11,966,581	13,053,403
Value.....		7,261,927	7,745,867
Imported mixed gas.....		107,946	129,138
Manufactured gas.....			796
Total distributed.....		12,074,527	13,183,337

(a) Prepared by the Ontario Department of Mines.

Table 149.—Number of Gas Wells in Canada, by Provinces, 1938-1940

		New Brunswick	Ontario	Manitoba	Saskatchewan	Alberta	Canada
Productive wells at beginning of year...	1938	37	3,065	5	3	100	3,210
	1939	36	3,122	4	3	96	3,261
	1940	39	3,163		4	95	3,301
Number of productive wells drilled.....	1938	2	114			1	117
	1939	3	142				145
	1940	4	151				155
Number of dry wells drilled.....	1938		53				53
	1939		63				65
	1940	1	86		1		88
Number of wells abandoned.....	1938	3	89			1	93
	1939		84				84
	1940	1	91				93
Productive wells at end of year.....	1938	36	3,122	5	3	97	3,263
	1939	39	3,163	4	3	96	3,305
	1940	42	3,240		3	95	3,350

Table 150.—Natural Gas Wells in Ontario, by Townships, 1939 and 1940

Township	1939				1940			
	No. of producing wells in operation Dec. 31, 1938	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1939	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Amabel.....		1						
Bayham.....	68	6	1	4	65	1	6	1
Bertie.....	108		7	24	132	5	1	14
Binbrook.....	50				50	1		
Blenheim.....			1					
Brantford.....								2
Caistor.....	63	1			62	3	1	6
Camden Gore.....			3					
Canboro.....	153	6		1	155	4		3
Cayuga, North.....	194	2	1	3	193	5	1	2
Cayuga, South.....	56				56	1		
Charlottetown.....	13				13			
Chatham.....			2	1	4		7	3
Colchester.....							5	
Crowland.....	26			1	27			1
Dawn.....	23		2		24			
Delaware.....			1					
Dereham.....	58	4	2	7	62	8	8	2
Dorchester, North.....							2	
Dorchester, South.....							1	
Dover, East.....	21	1	2		19	1		1
Dover, West.....								
Dunn.....	49		5		50	1		
Enniskillen.....	1		1		2	2		
Gainsboro.....	15				14	1		
Glanford.....	10				10			
Gosfield, South.....	25	3		1	26	2		1
Hallowell.....				6	6			2
Houghton.....	4				4			
Humberstone.....	56			1	57		2	12
London.....			1					
Malahide.....	1		8	25	1	1	6	28
Malden.....							4	2
McGillivray.....							1	
Mersea.....	3			2	4	1		
Middleton.....	55		1		42	1	1	3
Mosa.....							1	
Moulton.....	112	7		3	116	4		
Norwich N.....							2	
Norwich S.....							1	
Nottawasaga.....								1
Oneida.....	66	3		4	64	2	4	8
Onondaga.....	36				37	2		1
Orford.....							1	
Plympton.....							1	
Rainham.....	306	4	4	16	323	6	3	8
Raleigh.....	50	2	3	5	56	1	4	6
Romney.....	137	4			133			1
Sarnia.....	4				5			

Table 150.—Natural Gas Wells in Ontario, by Townships, 1939 and 1940—Concluded

Township	1939				1940			
	No. of producing wells in operation Dec. 31, 1938	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1939	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Seneca.....	158	6		4	151	5	7	7
Sherbrooke.....	15	1			15			
Southwold.....			1				1	
Tilbury East.....	139	10	2	2	132	4		
Townsend.....	2				2			1
Tuscarora.....	78	12		9	75	13	1	10
Wainfleet.....	29	2	1		27	1		
Walpole.....	422	7	6	13	425	12	9	15
Walsingham, N.....	9				8	1		
Walsingham, S.....	17			2	19			
West Oxford.....							1	
Willoughby.....	42		4	6	50	2	3	5
Windham.....	10	1			9			2
Woodhouse.....	69	1	3		69			6
Yarmouth.....			1				1	
Private wells.....	300				300			
Surface wells.....	69				69			
Total.....	3,122	84	63	142	3,163	91	86	151

Table 151.—Capital Employed in the Natural Gas Industry in Canada, by Provinces, 1939 and 1940

	1939			1940		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—						
Cost of lands, buildings, plant, machinery and tools.....	40,281,295	24,182,126	*66,176,710	43,032,620	24,367,282	69,212,643
Cost of supplies and stock on hand.....	544,870	221,013	*781,307	625,251	215,341	863,730
Cash, trading and operating accounts and bills receivable.....	9,110,297	2,141,126	*11,451,321	7,865,881	2,385,258	10,411,393
Total.....	49,936,462	26,544,265	*78,409,338	51,523,752	26,967,881	80,487,766

* Includes data for New Brunswick and Saskatchewan.

Table 152.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1939 and 1940

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1939					\$	\$	\$
New Brunswick.....	13	8	59	80	40,079	78,496	118,575
Ontario.....	496	127	791	1,414	942,397	742,868	1,685,265
Saskatchewan.....	3		8	11	3,720	3,508	7,223
Alberta.....	98	44	343	485	216,088	509,064	725,152
Canada.....	610	179	1,201	1,990	1,202,284	1,333,936	2,536,220
1940							
New Brunswick.....	12	9	74	95	35,899	82,625	118,524
Ontario.....	498	146	898	1,542	953,116	878,374	1,831,490
Saskatchewan.....	2		10	12	1,974	6,934	8,908
Alberta.....	99	45	396	540	227,847	561,971	789,818
Canada.....	611	200	1,378	2,189	1,218,836	1,529,904	2,748,740

* See footnote on page 30.

Table 153.—Production of Peat (for Fuel) in Canada, 1935-1940

Year	Tons	Value	Year	Tons	Value
1935.....	1,340	5,761	1938.....	620	3,500
1936.....	1,341	7,376	1939.....	445	2,445
1937.....	478	2,676	1940.....	30	75

THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products

(1) Production of Crude Petroleum

The Canadian production of crude petroleum and natural gasoline set up a new high record in 1940 when 8,590,978 barrels worth \$11,160,213 were produced. In 1939, the output totalled 7,826,301 barrels worth \$9,846,352.

Production from New Brunswick wells in 1940 amounted to 22,167 barrels compared with 22,799 barrels in the preceding year. As in former years, the 1939 output was obtained from the Stoney Creek field, near Moncton.

Ontario's production decreased to 187,644 barrels worth \$397,078 as against 206,379 barrels worth \$401,430 in 1939. Mr. A. R. Crozier, Acting Commissioner of Gas for Ontario, summarizes the Natural Gas and petroleum situation in the province as follows:

"For the first time since 1937, the annual quantity of petroleum produced in Ontario showed a decrease. The production of 187,644 barrels represents a decrease of 18,735 barrels as compared with the year 1939. The Bothwell-Thamesville and the Warwick-Metcalf-Adelaide fields witnessed considerable drilling activity, but both fields showed a decrease in production. In the Dover field there was little activity, and production decreased substantially from the previous year. The Oil Springs and Petrolia fields contributed considerable quantities of petroleum, although, as for the past thirteen years, there was a slight decline in the annual production. Production in the Mosa field increased sharply and exceeded any year since 1920.

"The total number of wells drilled during the year was 78 as compared to 148 for the previous year. Of the 78 wells, 42 were producers, 22 less than in 1939. This sharp decline in the number of wells completed during the year may be accounted for by the fact that the petroleum operator encountered considerable difficulties in financing drilling operations, possibly owing to the uncertainties of war-time conditions. The number of producing wells either operating or non-operating was 3,487, one less than in 1939. However, during the year there were 18 old wells re-opened and placed in production, which indicates that the practice of employing efficient methods of salvaging and reconditioning old wells continued to produce results.

"The average price paid for Ontario crude was \$2.11 in 1940, an increase of 16 cents a barrel over last year, and represents a return to the normal price existing for the past six years. This upward trend of oil prices for Ontario crude relieved to some extent the problems of the oil producer who in general operates on a small margin of profit. It is anticipated that the trend of crude oil prices may continue to increase at least for the duration of the war. Such an incentive as higher crude oil prices, it is hoped, will encourage greater exploration and development of oil supplies in southwestern Ontario."

A new high level was reached in the production of crude petroleum and natural gasoline in Alberta in 1940; the year's output totalled 8,362,203 barrels compared with 7,576,932 barrels in 1939, the previous record year.

Four natural gasoline absorption plants were active in Alberta during 1940. The Royalite Oil Co. Limited operated two of these plants; the other two were operated by the Gas & Oil Products Limited and the British American Oil Company. The total natural gasoline output from these plants in 1940 was 256,384 barrels against 299,409 barrels in the preceding year and 503,612 barrels in 1938.

Drilling operations were in progress on 39 wells in Alberta during 1940 and approximately 236,928 feet were drilled; 35 wells were brought into production and 7 dry wells were drilled. Two hundred and thirty-five wells were in operation in Alberta at the close of 1940 and drilling was in progress on 39 other wells at the close of the year. Operations in oil and gas wells in this province resulted in the use of 906,878 feet of casing weighing 7,483 tons. In the previous year, 318,901 feet of casing weighing 5,068 tons were used. Capital employed by the 107 firms active in Alberta during the year amounted to \$51,604,906. These firms employed 1,463 salaried employees and wage-earners who received salaries and wages totalling \$2,641,395.

Three wells in the Northwest Territories, near Fort Norman, were operated during 1940 and produced 18,633 barrels of crude petroleum as compared with 20,191 barrels in the previous year. This oil is treated at a small refinery near Fort Norman. The resultant products, gasoline and fuel oil, were used to considerable extent by mining and transportation companies in this area.

Table 154.—Production of Crude Petroleum in Canada, by Provinces, 1931-1940

Year	New Brunswick		Ontario		Alberta		Northwest Territories		Canada	
	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$
1931.....	6,577	15,461	122,365	219,993	1,413,631	3,976,220	.....	.....	1,542,573	4,211,674
1932.....	6,408	14,332	130,343	247,468	906,751	2,751,541	910	9,251	1,044,412	3,022,592
1933.....	8,835	18,111	136,058	253,486	995,832	2,844,157	4,608	23,037	1,145,333	3,138,791
1934.....	11,106	22,277	141,385	299,874	1,253,966	3,104,823	4,438	22,188	1,410,895	3,449,162
1935.....	12,954	18,230	165,041	346,156	1,263,510	3,102,227	5,115	25,575	1,446,620	3,492,188
1936.....	17,112	24,075	165,495	350,767	1,312,368	3,019,930	5,399	26,995	1,500,374	3,421,767
1937.....	18,089	25,496	165,205	356,000	2,749,085	4,961,002	11,371	56,855	2,943,750	5,399,353
1938.....	19,276	27,246	172,641	359,268	6,751,312	8,775,094	22,855	68,565	6,966,084	9,230,173
1939.....	22,799	32,082	206,379	401,430	7,576,932	9,362,363	20,191	50,477	7,826,301	9,846,352
1940.....	22,167	31,220	187,644	397,078	8,362,203	10,694,394	18,633	37,265	*8,590,978	*11,160,213

* Includes 331 barrels at \$256 in Saskatchewan.

Table 155.—Production of Crude Petroleum in Canada, by Months, 1940

(Barrel=35 imperial gallons)

Months	*New Brunswick	Ontario	*Alberta	*Northwest Territories	Canada
	Brl.	Brl.	Brl.	Brl.	Brl.
January.....	141	15,845	460,125	.....	476,111
February.....	126	15,690	629,033	.....	644,849
March.....	131	13,772	545,491	.....	559,394
April.....	2,070	15,710	606,352	.....	624,132
May.....	2,598	16,122	646,999	274	665,993
June.....	2,358	14,788	627,054	2,402	646,602
July.....	2,503	17,726	842,991	3,417 (a)	866,968
August.....	2,705	15,466	833,832	6,152	858,155
September.....	2,235	18,848	804,069	6,104	831,256
October.....	2,658	16,052	788,106	284	807,100
November.....	2,503	13,952	866,246	.....	882,701
December.....	2,139	13,673	711,905	.....	727,717
Total.....	22,167	187,644	8,362,203	18,633	(a)8,590,978

*These figures represent the total output each month.

(a) Includes 331 brls. in Saskatchewan.

Table 156.—Production of Crude Petroleum in Canada, 1939 and 1940

Provinces	1939		1940	
	Barrels	Total value	Barrels	Total value
NEW BRUNSWICK.....	22,799	\$ 32,082	22,167	\$ 31,220
ONTARIO—				
Petrolia and Enniskillen.....	56,951	109,934	55,589	116,658
Oil Springs.....	32,442	65,715	31,392	69,016
Moore Township.....	1,527	2,947	1,307	2,743
Sarnia Township.....	397	766	370	776
Plympton Township.....	156	301	89	187
Bothwell Township.....	39,616	76,364	35,873	75,280
West Dover.....	15,037	29,023	11,856	24,880
Onondaga.....	219	507	957	2,169
Mosa Township.....	12,857	24,816	17,288	36,279
Brooke.....	52	101	51	107
Dunwich.....	210	405	337	707
Raleigh and Tilbury East.....	27	52	76	160
Thamesville.....	1,293	2,496	811	1,702
Dawn and Euphemia.....	3,958	7,639	2,294	4,814
Warwick.....	41,478	80,057	29,354	61,600
Chatham.....	159	307		
Total for Ontario.....	206,379	401,430	187,644	397,078
ALBERTA—				
Turner Valley.....	7,543,929	9,334,069	8,326,141	10,668,155
Red Coulee-Border-Keho (light crude).....	12,649	11,137	12,080	10,872
Wainwright-Skiff (heavy crude).....	20,354	17,157	23,982	15,367
Taber-Moose Dome.....				
Total for Alberta.....	7,576,932	9,362,363	8,362,203	10,694,394
NORTHWEST TERRITORIES.....	20,191	50,477	18,633	37,265
Canada.....	7,826,301	9,846,352	*8,590,978	*11,160,213

* Includes 331 barrels at \$256 in Saskatchewan.

Table 157.—Petroleum Wells in Canada, by Provinces, 1938-1940

	New Brunswick	Ontario	Alberta	Canada
Productive wells at beginning of year.....1938	23	2,082	157 (a)	2,264
.....1939	23	2,110	195 (a)	2,330
.....1940	22	2,065	219 (a)	2,303
Number of productive wells drilled.....1938	1	56	43	100
.....1939		63	36	99
.....1940		42	35 (b)	78
Number of wells abandoned.....1938	1	28	2	31
.....1939		36	7	43
.....1940	2	61	2	65
Number of dry wells drilled.....1938		41	7	48
.....1939	1	85	13	99
.....1940		36	7	43
Number of productive wells in operation at end of year.....1938	23	2,110	195 (a)	2,330
.....1939	23	2,065	219 (a)	2,309
.....1940	20	2,028	235 (c)	2,286

(a) Includes 2 wells in the Northwest Territories.

(b) Includes 1 well in the Northwest Territories.

(c) Includes 3 wells in the Northwest Territories.

Table 158.—Capital Employed in the Petroleum Industry in Canada, by Provinces,* 1939 and 1940

	1939			1940		
	Ontario	Alberta	Canada†	Ontario	Alberta	Canada†
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$	\$	\$	\$	\$
Cost of lands, buildings, plant, machinery and tools.....	1,170,088	42,769,249	44,028,161	1,185,889	40,956,466	42,289,564
Cost of supplies and stocks on hand.....	18,484	988,114	1,031,312	20,936	1,021,178	1,080,875
Cash, trading and operating accounts and bills receivable.....	63,622	6,847,458	7,042,604	69,691	9,627,262	9,846,414
Total.....	1,252,194	50,604,821	52,102,077	1,276,516	51,604,906	53,216,853

* Data for New Brunswick included in the "Natural Gas Industry."

† (a) Includes data for the Northwest Territories.

Table 159.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces,† 1939 and 1940

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1939					\$	\$	\$
Ontario.....	18	3	249	270	21,499	145,927	167,426
Alberta†.....	221	41	1,248	1,510	510,541	1,890,016	2,400,557
Canada.....	239	44	1,497	1,780	532,040	2,035,943	2,567,983
1940							
Ontario.....	18	3	247	268	22,983	147,234	170,217
Alberta†.....	281	46	1,146	1,473	731,246	1,933,947	2,665,193
Canada.....	299	49	1,393	1,741	754,229	2,081,181	2,835,410

* See footnote on page 30.

† Data for New Brunswick included in the "Natural Gas Industry."

‡ Data for Northwest Territories included with Alberta.

Table 160.—Casing Used in the Petroleum and Natural Gas Industries in Canada, 1940

Size	Weight	Length	Size	Weight	Length
Inches	Pounds	Feet	Inches	Pounds	Feet
1.....	48	200	5½.....	13,975	1,150
1½.....	22,500	11,241	6.....	362,570	22,236
2.....	1,234	2,204	6½.....	240,658	14,824
2½.....	1,748	2,056	6¾.....	533,840	21,014
3.....	1,739	1,526	6¾.....	397,526	15,001
3½.....	38,051	20,612	7.....	7,080,534	276,847
4.....	6,927	3,450	7½.....	162,151	17,327
4½.....	7,774	1,030	8.....	17,644	663
5.....	227,729	51,158	8½.....	803,676	26,276
5½.....	145,243	68,800	8¾.....	144,360	4,010
6.....	4,842	745	9.....	162,565	22,370
6½.....	1,125,759	161,104	9½.....	1,197,719	28,638
7.....	720,755	84,264	10.....	4,137	95
7½.....	106,175	9,653	12.....	13,380	223
8.....	3,429	408	13.....	1,181,768	22,902
8½.....	178,368	11,148	20.....	9,270	103
9.....	11,223	1,335	21½.....	833	9
9½.....	5,398	635			
10.....	29,393	1,621	Total.....	14,964,941	506,878

2. PETROLEUM PRODUCTS INDUSTRY IN CANADA

Thirty-eight petroleum refineries operating in Canada during 1940 were distributed by provinces as follows: 10 in Saskatchewan, 9 in Alberta, 5 in Ontario, 4 in Quebec, 4 in Manitoba, 3 in British Columbia and 1 in each of Nova Scotia, New Brunswick and Northwest Territories. There was a loss of 2 refineries in Alberta, 1 in Saskatchewan and 1 in Manitoba. The operating refineries had a capacity of 217,270 barrels of crude oil per day, of which Quebec had 64,500 barrels or 29.7 per cent; Ontario, 57,500 barrels or 26.5 per cent; Nova Scotia, 32,500 barrels or 14.9 per cent; British Columbia, 24,500 barrels or 11.3 per cent; Alberta, 16,850 barrels or 7.7 per cent; Saskatchewan, 16,220 barrels or 7.5 per cent; Manitoba, 4,150 barrels or 2 per cent; the Northwest Territories, 800 barrels or 0.4 per cent, and New Brunswick, 750 barrels. Location, type and capacity for each of these refineries is recorded in the directory at the end of this report.

During the year 1,443,258,451 gallons of imported crude oil and 302,235,830 gallons of crude oil and absorption gasoline from Canadian wells, or a total of 1,745,494,281 gallons was put through Canadian refineries, this amounting to about 63 per cent of the rated capacity. Of the total crude input, about 57 per cent was imported from the United States and nearly 26 per cent from other countries, while about 17 per cent came from Canadian wells. The total cost at the

refineries of all crude oil and naphtha charged to stills during the year was \$85,740,625. Stocks of crude oil held at the refineries on December 31 amounted to 200,580,058 gallons.

Refinery production of gasoline in 1940 amounted to 779,983,106 gallons, and in addition the refineries used for blending about 49,363,996 gallons of imported casinghead gasoline which is not included in the Canadian production figures. The gallonage of gasoline made in 1940 was the highest on record, being 5 per cent over 1939, which in turn was 13 per cent over 1938. The refinery selling value of the gasoline made during the year was \$71,226,944. Stocks of gasoline held by the reporting firms on December 31 included 110,584,376 gallons of straight run or cracked gasoline and 3,748,699 gallons of imported casinghead gasoline. In 1940 there was an output of 8,538,070 gallons of natural gasoline from absorption plants in Alberta. This was practically all sold to refineries and is included with the gallonage charged to stills and the refined gasoline made therefrom is included in the refinery output figures.

Imports of gasoline, including casinghead, amounted to 105,586,068 gallons during 1940, which, added to a production of 779,983,106 gallons plus the decline in refinery stocks of 15,280,355 gallons and less the exports of 4,320,701 gallons, made an apparent Canadian consumption of 896,528,828 gallons. Actual sales reported to the Provincial Governments under the Gasoline Tax Acts amounted to 883,290,294 gallons.

Production of fuel and gas oils (excluding any made and used for cracking processes) totalled 698,913,302 gallons, of which 637,628,616 gallons were made for sale and 61,284,686 gallons for use as fuel in the producing plant. Imports amounted to 101,806,725 gallons and exports to 2,699,135 gallons. Refinery stocks at the end of the year stood at 92,710,869 gallons, or about 21½ million gallons more than in 1939. The apparent consumption of fuel and gas oils in Canada, as calculated from the above figures, amounted to 776,586,326 gallons.

Output of tractor and engine distillates was 23,797,763 gallons in 1940, imports amounted to 713,482 gallons, and producers' stocks declined 3,428,565 gallons. The apparent Canadian consumption was 27,939,810 gallons.

Total Canadian output of lubricating oils, including production from the refineries, amounted to 30,006,720 gallons in 1940 against 25,017,072 gallons in 1939. By adding to this total the imports of 18,506,716 gallons and deducting the increase in refinery stocks a consumption in Canada of 48,261,092 imperial gallons is indicated.

Lubricating greases were produced as follows, 1,069,891 pounds in the blending plants and 9,441,500 pounds in the refineries, a total of 10,511,391 pounds. The latter quantity plus the imports of 9,184,153 pounds indicates a Canadian consumption of 19,695,544 pounds during 1940.

Table 161.—Materials Used in Petroleum Refineries of Canada, 1939 and 1940

Material	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost of works
			\$		\$
Crude oil (under 60° A.P.I.) in its natural state, from Canadian wells.....	Imp. gal.	253,964,242	11,813,685	293,601,299	13,651,059
Crude Naphtha (60° A.P.I. and over) in its natural state, from Canadian wells.....	Imp. gal.	5,750,952	338,747	.....	.....
Absorption gasoline, etc., from Canadian wells (run to stills).....	Imp. gal.	2,483,690	160,059	8,634,531	531,410
Crude oil, in its natural state, imported, (run to stills)—					
(a) From United States.....	Imp. gal.	994,341,531	45,025,216	996,917,614	50,083,035
(b) From Other Countries.....	Imp. gal.	311,019,875	10,577,842	445,437,156	21,434,013
Crude oil, not in its natural state, (run to stills).....	Imp. gal.	2,343,005	131,285	903,681	41,108
Benzol for blending.....	Imp. gal.	2,087,860	328,321	1,762,372	284,410
Phenol.....	pound	249,472	41,674	203,150	31,270
Sulphuric acid, 66° Bé.....	pound	20,377,249	219,201	27,995,157	301,446
Sulphur.....	pound	175,727	4,161	122,131	3,110
Caustic soda.....	pound	4,100,782	127,642	6,122,558	177,477
Soda ash.....	pound	648,267	13,330	664,826	13,662
Litharge.....	pound	267,923	23,027	323,510	26,121
Fullers' earth and clay.....	pound	19,814,473	304,214	23,828,660	406,185
Compounding materials.....	\$	.....	507,992	.....	945,628
Tetraethyl fluid.....	\$	.....	3,023,903	.....	4,309,173
Other materials.....	\$	.....	417,155	.....	1,017,069
Shipping containers.....	\$	.....	864,752	.....	1,046,713
Total.....	\$	.....	73,922,206	.....	94,302,889
<i>Lubricating Oils and Greases Total.....</i>			543,394		557,632
Grand Total.....			74,465,600		94,860,521

Table 162.—Products Made in Petroleum Refineries, 1939 and 1940

Product	Unit of measure	1939		1940	
		Quantity	Gross selling value at works	Quantity	Gross selling value at works
			\$		\$
MADE FOR SALE—					
Gasoline—Straight run (1).....	Imp. gal.	405,564,360	35,820,713	391,080,428	35,251,773
—By cracking process (2).....	Imp. gal.	334,806,309	28,651,369	388,663,777	35,950,732
Stove oil (40°-42.5° A.P.I.).....	Imp. gal.	18,051,831	781,873	19,933,578	889,874
Gas and light fuel oil (20°-40° A.P.I., except diesel).....	Imp. gal.	86,120,186	4,061,854	114,798,038	5,753,019
Diesel fuel oil (all fuel oil sold under this name).....	Imp. gal.	54,144,956	2,323,585	62,968,656	3,261,731
Residual fuel oil (10°-20° A.P.I.).....	Imp. gal.	362,915,573	12,140,704	439,928,344	17,050,341
Tractor and engine distillate.....	Imp. gal.	33,618,261	2,607,008	23,795,943	2,138,333
V.M. and P. or solvent naphtha.....	Imp. gal.	8,218,123	647,534	12,686,637	1,167,633
Kerosene.....	Imp. gal.	27,245,025	2,481,379	25,946,909	2,387,294
Lubricating oil.....	Imp. gal.	23,578,851	4,243,728	28,380,256	5,530,531
Lubricating grease.....	pound	12,287,647	629,082	9,441,500	549,456
Asphalt.....	Imp. gal.	56,571,431	4,419,190	60,312,753	5,226,995
Petroleum coke.....	short ton	62,094	370,936	63,458	416,262
Other products.....	\$		338,189		551,763
Total—Made for sale.....	\$		99,517,144		116,128,737
MADE FOR OWN USE—					
Gasoline—Straight run.....	Imp. gal.	173,877	16,475	223,028	22,537
—By cracking process.....	Imp. gal.	19,073	2,461	15,873	1,902
Gas and light fuel oil (20°-40° A.P.I.).....	Imp. gal.	113,677	6,029	113,769	4,868
Residual fuel oil (10°-20° A.P.I.).....	Imp. gal.	61,317,404	2,026,429	61,165,490	2,431,454
Kerosene.....	Imp. gal.	15,230	1,308	26,550	2,326
Lubricating oil.....	Imp. gal.	77,462	13,413	83,582	15,324
Tar.....	pound	1,536,570	6,829		
Asphalt.....	Imp. gal.	43,607	3,332	68,260	5,411
Petroleum coke.....	short ton	4,238	18,253	4,876	25,328
Still gas.....	M cu. ft.	7,802,666	1,671,238	8,706,834	2,164,514
Other products.....	\$		211,327		210,096
Total—Made for own use.....	\$		3,977,094		4,883,760
Grand Total.....	\$		103,494,238		121,012,497
Fuel and gas oils made for use in cracking process.....	Imp. gal.	576,923,544		656,902,708	
Lubricating oils and greases—					
Greases, lubricating.....	pound	845,140	155,997	1,069,891	175,177
Oils, lubricating.....	gallon	1,360,759	796,872	1,542,882	876,679
Soaps and soap powders.....			33,117		48,107
All other products.....			98,293		100,340
Total.....			1,084,279		1,200,303

(1) Includes recoveries from Turney Valley naphtha and natural gasoline run to refinery stills but does not include the imported casinghead gasoline which was used for blending at the refineries.

(2) Includes all aviation grade gasoline.

CHAPTER EIGHT

THE NON-METALLIC MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Asbestos	Miscellaneous	Magnesitic dolomite
Feldspar, Nepheline	Barytes	Magnesium sulphate
Syenite and Quartz	Diatomite	Mineral waters (natural)
Gypsum	Fluorspar	Phosphate
Iron oxides (ochre)	Garnet	Pyrites (sulphur)
Mica	Graphite	Silica brick
Salt	Grindstones, etc.	Sodium carbonate
Talc and soapstone	Lithium minerals	Sodium sulphate
		Strontium minerals

THE ASBESTOS MINING INDUSTRY, AND THE ASBESTOS PRODUCTS INDUSTRY

Production (mine sales) of asbestos in Canada during 1940 was slightly lower in both quantity and value as compared with the output of 364,472 short tons valued at \$15,859,212 in 1939. The value of sales in 1939 was the highest ever recorded and the tonnage shipped was surpassed only by that of 1937. The entire production in the Dominion during 1940 came from mines in the eastern townships of the province of Quebec. Owing to wartime censorship, complete data relating to 1940 production of asbestos in Canada are not available for publication.

Canadian asbestos as produced commercially in Quebec is of the chrysotile or serpentine variety and is of high quality. Reserves of milling grade asbestos rock have been reported as sufficient for many years of commercial fibre production. Production of asbestos in Canada from 1880 to 1940, inclusive, totalled 7,277,173 short tons valued at \$270,637,374.

The average value per ton for all grades of mine shipments in 1940 was \$45.04 compared with \$43.51 in 1939; value of crudes in 1940 was \$372.12 per ton against \$300.68 in 1939; fibres, \$63.85 per ton in 1940 compared with \$62.12 in 1939 and shorts, \$19.98 in 1940 against \$17.15 in the preceding year.

The total value of Canadian asbestos exports in 1940 reached \$15,832,755 compared with \$15,844,703 in 1939. Imports into Canada of various asbestos products in 1940 were appraised at \$1,620,385, against \$1,072,443 in the preceding year.

The number of Canadian asbestos companies reported as active in 1940 totalled 8; capital employed in the industry amounted to \$19,799,280; employees numbered 3,886 against 3,784 in 1939 and salaries and wages distributed aggregated \$4,728,702 compared with \$4,347,064 in 1939.

Thermal studies on asbestos have recently been made in the laboratories of the National Research Council, Ottawa, and the following abstracts are from papers published by the Council:

I. Effect of Temperature and Time of Heating on Loss in Weight and Resorption of Moisture, by D. Wolochow and W. Harold White, N.R.C. No. 969.

"Heating a chrysotile asbestos mill fibre has shown that in the approximate temperature range of 500 to 700 degrees C. the loss in weight depends on both the time and temperature. At other temperatures the loss is practically independent of the time.

"Prolonged heating at about 490 degrees C. expelled about 25 per cent and at 510 degrees C. about 50 per cent of the combined water. Complete dehydration occurred on prolonged heating at about 580 degrees C., but only above 700 degrees C. was the loss in weight rapid.

"On the basis of the data obtained on the resorption of moisture it is suggested that heating for half an hour at 215 degrees C. would be a more accurate and rapid method for determining free moisture than that commonly employed."

II. Effect of Heat on the Breaking Strength of Asbestos Tape and Glass Fibre Tape, by D. Wolochow, N.R.C. No. 970.

"The first result of heating pure chrysotile asbestos tape, crocidolite (blue) asbestos tape, and glass fibre tape to drive off the absorbed moisture is an increase in breaking strength.

"Pure chrysotile tape does not lose strength till a temperature of 370 degrees C. is exceeded. Prolonged heating at 430 degrees C. causes a loss in strength of about 20 per cent, at 480 degrees C. of about 40 per cent. Heating at 540 degrees C. causes a rapid loss in strength.

"Crocidolite asbestos tape loses strength more rapidly than chrysotile asbestos tape.

"Glass fibre tape, although initially stronger than chrysotile tape, is considerably less resistant to heat, beginning to lose strength rapidly at about 250 degrees C., whereas chrysotile asbestos tape does not suffer any appreciable decrease in strength till a temperature of 400 degrees C. is exceeded."

III. Effect of Heat on the Breaking Strength of Asbestos Cloth Containing Cotton, by D. Wolochow, N.R.C. No. 972.

"Commercial underwriters' and A grades of asbestos cloth begin to lose strength as soon as heat is applied. On heating for five minutes at 300 degrees C. these three grades of asbestos cloth lose approximately 60, 35, and 25 per cent of their original (conditioned) breaking strength, respectively. Charts are given showing the effect of heating, at temperatures up to 600 degrees C., for periods up to one hour."

MARKET CONDITIONS

(From the June, 1941 publication "Asbestos"—Philadelphia, Pa.)

General Business.—The effect of the Defence Program on general business in the United States is being felt to an extent which, despite various warnings and constant reminders, was not really expected by the public six months ago.

The American Public's fond belief that we can do anything we set out to do, while partially justified, at the same time makes it difficult to accomplish all that is to be done, because of the indifference resulting from that belief.

At that the progress to date which has been made in the program is altogether amazing, considering that we had to start practically from "scratch". The rapidity with which many confusing and hindering factors have been straightened out or disposed of, is deserving of the highest congratulations.

Asbestos-Raw Material.—The United States is drawing its asbestos requirements more heavily from Canada than for many months past.

Shipments of other types of asbestos from South Africa are reaching these shores with accelerated speed. Larger shipments than formerly are reaching us from Australia and India.

Prices on all asbestos, other than Canadian, are showing an advance due to the increase in ocean freight, marine and war risk insurance rates.

Asbestos-Manufactured Goods.—Textiles: There is little new to report on the textile situation. Demand continues to increase; inquiries continue in increasing numbers; prices have reached a more satisfactory level than for many years past, and this does not mean that they are now exorbitantly high, but rather that they were formerly extraordinarily low. Naturally most of this activity, as the activity in many other commodities, is due to defence—in fact much of the demand can be traced to the use of insulating tapes and other textile products in motors.

Prices (U.S.A.)

All prices for asbestos are quoted on a short-ton basis from Metal and Mineral Markets, published by the McGraw-Hill Publishing Co., Inc., New York City. Canadian prices are f.o.b. Quebec mines, tax and bags included; Rhodesian, South African, and Russian prices, c.i.f. New York; and Vermont prices, f.o.b. mines, Vermont.

Prices were constant throughout the year except for certain grades, where indicated the prices were advanced in August for the remainder of the year:

Canadian: Crude No. 1, \$700-\$750; Crude No. 2 and sundry crudes, \$150-\$350; spinning fibers, magnesias and compressed sheet fibers, \$110-\$200; shingle stock, \$57-\$78; paper stock, \$40-\$45. Cement stock, \$21-\$25 (advanced to \$22-\$26); floats, \$18-\$20 (advanced to \$19-\$21); and shorts, \$12-\$16.50 (advanced to \$13-\$17.50). Canadian quotations are in American dollars rather than Canadian dollars.

Rhodesian: Crude No. 1, \$300; and Crude No. 2, \$260.

South African: Amosite: Grade B1 (white), \$140 (advanced to \$150); Grade B3 (dark), \$120. Transvaal Blue: Grade B (long fiber), \$400; Grade S (short fiber), \$140 (advanced to \$150).

Russian Crude: "AA" \$750; Crude No. 1, \$275; Crude No. 2, \$240; and shingle stock, \$67.50 and up.

Vermont: Shingle stock, \$57; paper stock, \$40; cement stock, \$25; and shorts and floats, \$12-\$18 (advanced to \$13-\$18).

Table 163.—Sales and Shipments* of Canadian Asbestos, 1939 and 1940

	1939		1940	
	Tons	\$	Tons	\$
Crudes.....	3,121	938,718	2,060	766,562
Fibres.....	(b) 193,992	12,049,539	181,581	11,563,844
Shorts.....	167,359	2,870,955	163,164	3,259,459
Total.....	364,472	15,859,212	346,805	15,619,865
Sand, gravel, and stone (waste rock only) (a).....	3,897	2,930	6,482	4,791

(*) All from the province of Quebec unless otherwise noted.

(a) This production is included under the sand and gravel industry.

(b) Includes 18 tons valued at \$720 produced in Ontario.

Table 164.—Asbestos Rock Mined and Milled, 1939-1940

	1939	1940
	Tons	Tons
Quantity of rock mined.....	6,650,416	7,612,150
Quantity of rock milled.....	5,548,765	5,908,226

Table 165.—Sales and Shipments of Asbestos, 1931-1940

Year	Tons	\$	Year	Tons	\$
1931.....	164,296	4,812,886	1936.....	301,287	9,958,183
1932.....	122,977	3,039,721	1937.....	410,026	14,505,791
1933.....	158,367	5,211,177	1938.....	287,793	12,890,195
1934.....	155,980	4,936,326	1939.....	364,472	15,859,212
1935.....	210,467	7,054,614	1940.....	346,805	15,619,865

Table 166.—Consumption of Asbestos in Specified Canadian Industries, 1938-1940

Industry	1938		1939		1940	
	Quantity	Cost at works	Quantity	Cost at works	Quantity	Cost at works
		\$		\$		\$
Electrical Apparatus and Supplies—						
Board.....pound	178,401	32,477	179,631	30,521	357,372	61,316
Yarn.....pound	71,851	27,424	120,394	46,474	103,932	36,895
Tape.....pound	14,945	13,602	21,350	11,194	29,771	27,708
Boilers, Tanks and Engines.....		7,309		6,556		10,114
Asbestos Products—						
Fibre.....						
Other forms.....						
Roofing paper.....ton		73,140	3,740	145,792	2,545	103,810
Cotton goods, n.e.s.....pound	20,171	1,050	16,640	592	10,395	578
Woollen goods, n.e.s.....pound	127,321	35,649	149,732	40,051	181,264	51,072

See Table 23—Asbestos Products Industry

"The asbestos-bearing rock in Quebec is mined both in open pits and underground. The method of block-caving instituted at the King mine of Asbestos Corporation in 1934, has resulted in a remarkable reduction in cost of mining and improvement in grade of mill feed. This development coming at a time when many of the open pits had been worked almost to the economic depth and operators were faced with rising costs and with the prospect of being unable to recover much valuable rock in the walls of the pits, is of the utmost importance to the industry.

"Small deposits of chrysotile asbestos are known in other parts of Quebec and also in Ontario and British Columbia. Several of these have been worked from time to time but there is no production from any of them at present. Certain of these small deposits would yield asbestos having a very low iron content and entirely free from magnetite which should render the product of interest in connection with its use as insulation in electrical machinery.

"Numerous deposits of other varieties of asbestos occur in Canada including anthophyllite, fibrous tremolite, and fibrous actinolite, all referred to commercially as amphibole asbestos. The fibres are harsher and weaker than those of chrysotile and are in little present demand. None of these deposits is being worked, although formerly fibrous actinolite was quarried near the village of Actinolite, Hastings county, Ontario, for use in the making of roofing materials. Asbestos deposits reported as having been found in recent years in Manitoba east of Lake Winnipeg, and in Ontario in the Lake of the Woods district and 260 miles north of North Bay, are of the amphibole varieties. There is a possibility that material from some of these deposits may be suitable for use in special products, such as, acid filters, and where long, harsh fibres are required." (Bureau of Mines—Ottawa).

Table 167.—Capital Employed in the Asbestos Industry in Canada, 1940

	\$
Present cash value of the land (excluding materials).....	3,729,108
Present value of buildings, fixtures, machinery, tools and other equipment.....	7,557,609
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	1,067,667
Inventory value of finished products on hand.....	1,709,618
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	5,735,278
Total	19,799,280

Table 168.—Principal Statistics of the Asbestos Mining Industry in Canada, 1939 and 1940

	1939	1940
Number of firms.....	8	8
Capital employed..... \$	22,489,233	19,799,280
Number of employees—On salaries (c).....	299	320
On wages.....	3,485	3,566
Total	3,784	3,886
Salaries and wages—Salaries..... \$	608,529	641,770
Wages..... \$	3,738,535	4,086,932
Total \$	4,347,064	4,728,702
Selling value of products (a)..... \$	15,862,142	15,624,656
Cost of fuel and electricity (purchased).....	1,376,568	1,520,907
Cost of process supplies (b).....	2,086,945	2,200,061
Net value of sales..... \$	12,398,629	11,903,688

(a) Includes value of sand and gravel.

(b) Explosives, drill steel, etc.

(c) In 1940 includes 40 females and 41 in 1939.

Table 169.—Wage-Earners Employed, by Months, in the Asbestos Mining Industry in Canada, 1939-1940

Month	1939	1940		
	Total	Mine		Mill
		Surface	Underground	
January.....	3,121	1,467	559	1,608
February.....	3,227	1,504	505	1,605
March.....	3,081	1,362	510	1,593
April.....	3,212	1,476	556	1,555
May.....	3,272	1,515	590	1,602
June.....	3,544	1,563	626	1,615
July.....	3,631	1,621	586	1,604
August.....	3,697	1,601	583	1,615
September.....	3,737	1,566	567	1,590
October.....	3,714	1,353	477	1,448
November.....	3,826	1,333	448	1,409
December.....	3,737	1,351	431	1,398

THE ASBESTOS PRODUCTS INDUSTRY, 1940

Thirteen factories in Canada were occupied in the manufacture of asbestos goods in 1940. Production by these works was valued at \$2,556,278, this output being 43 per cent above the 1939 total of \$1,783,993, and 67 per cent above 1938. Products included brake linings valued at \$883,911, boiler and pipe covering at \$250,701, clutch facings at \$166,406, asbestos packings at \$160,484 and such other lines as asbestos gaskets, paper, cloth, yarn, dryer felts, cements, etc.

The factories which operated in this industry in 1940 were distributed as follows: Quebec, 6; Ontario, 6; and in Nova Scotia, 1. Fixed and working capital as represented by these works totalled \$2,317,225; the number of employees averaged 476 for each month of the year, and payments in salaries and wages for the year amounted to \$591,982. Expenditures for fuel and electricity totalled \$126,352 and materials for manufacturing cost \$1,150,499.

Table 170.—Materials Used in the Asbestos Products Industry, 1939 and 1940

	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos fibre.....	lb.	6,895,578	144,864	12,454,956	229,824
Asbestos cloth.....	lb.	102,851	35,848	82,878	32,402
Asbestos paper, corrugated and plain.....	lb.	232,992	10,576	532,115	19,316
Asbestos sheets and strips.....	lb.	19,509	8,769	24,640	13,136
Asbestos yarn.....	lb.	427,445	121,227	401,313	133,006
Cotton cloth and yarn.....	\$	.....	56,607	.....	113,761
Rubber and rubber sheets.....	lb.	109,174	21,463	123,263	27,001
Containers and packing material.....	\$	.....	32,721	.....	44,740
All other materials.....	\$	.....	292,349	.....	537,313
Total.....	\$	.....	724,424	.....	1,150,499

Table 171.—Products Manufactured in the Asbestos Products Industry, 1939 and 1940

Product	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos brake linings—Moulded.....	ft.	2,245,559	489,305	3,383,085	735,305
Other.....	ft.	1,096,577	150,579	1,190,153	148,606
Asbestos boiler and pipe covering.....	ft.	1,769,485	156,878	2,671,445	250,701
Asbestos clutch facings.....	no.	633,498	147,249	611,529	166,406
Asbestos gaskets.....	lb.	38,185	19,669	43,087	23,904
Asbestos packings of all kinds.....	lb.	283,358	112,649	422,118	160,484
All other products (*).....	.....	.....	707,664	.....	1,070,872
Total.....	.....	.....	1,783,993	.....	2,556,278

(*) Includes products made by 1 or 2 firms, such as, asbestos dryer felt, hydraulic brake hose, asbestos shingles, asbestos yarn, packings of rubber, duck and flax, asbestos paper, asbestos cloth, etc.

FELDSPAR AND QUARTZ MINING INDUSTRY

Owing to the very close physical association of these minerals in many Canadian deposits (pegmatites), it has been found difficult for some operators to make a separation of all data pertaining to the mining of each individual mineral and, for this reason, the general statistics relating to capital, employment, fuel and electricity, etc., have been combined in this chapter. Since 1936, corresponding statistics relating to the production of nepheline-syenite have been included with those pertaining to the commercial production of feldspar and quartz.

During 1940 the gross value of production by the industry and including the value of feldspar, quartz and nepheline-syenite sold totalled \$1,508,999 compared with corresponding values at \$1,233,647 in 1938 and \$1,352,671 in 1939. In 1940 commercial shipments of feldspar were made only from properties located in Ontario and Quebec; quartz in various forms was produced in Nova Scotia, Quebec, Ontario and Saskatchewan while production of nepheline-syenite was confined to the province of Ontario.

The number of firms reported as active in the industry in 1940 totalled 44, capital employed was recorded at \$2,174,258, employees numbered 400, salaries and wages paid amounted to \$377,254 and the value of fuel, electricity and process supplies consumed totalled \$214,517. The net value of all products sold was estimated at \$1,294,482 compared with \$1,173,950 in 1939.

FELDSPAR

Production of feldspar in Canada during 1940 totalled 21,455 short tons valued at \$187,623 compared with 12,500 short tons at \$112,309 in 1939. Of the 1940 output, 8,548 tons, valued at \$89,004 were mined in the province of Quebec, and 12,907 tons at \$98,619 in Ontario.

Feldspar mining in Quebec is centred chiefly in the Buckingham district of the Ottawa Valley, while in Ontario the mineral is obtained principally in the Kingston-Perth area and the Nipissing district. Grinding mills are operated at Kingston, Ontario and Buckingham, Quebec. Exports of feldspar in 1940 totalled 14,255 tons valued at \$95,846 compared with 7,661 tons worth \$49,957 in 1939.

Table 172.—Production of Feldspar in Canada, by Provinces, 1931-1940

	Quebec		Ontario		Manitoba		Average value per tons
	Tons	\$	Tons	\$	Tons	\$	
							\$
1931.....	10,381	86,842	7,962	100,119			10.19
1932.....	3,390	39,062	3,657	42,920			11.63
1933.....	6,183	59,283	4,387	45,350			9.86
1934.....	9,207	78,853	7,302	61,665	1,793	6,763	8.05
1935.....	7,002	63,075	8,656	75,003	2,084	6,252	8.13
1936.....	8,115	75,703	8,409	70,840	1,322	7,932	8.66
1937.....	12,285	105,612	9,061	72,610			8.35
1938.....	5,874	62,878	8,106	65,964	78	451	9.22
1939.....	5,399	60,923	7,061	51,056	40	330	8.98
1940.....	8,548	89,004	12,907	98,619			8.75

Values shown in Table 172 include the values of both crude and milled products.

Table 173.—Feldspar Consumed in Specified Canadian Industries, 1939 and 1940

Industries	1939		1940	
	Tons	\$	Tons	\$
Abrasive products.....	45	1,368	68	2,056
Imported clay products.....	2,021	38,840	3,305	70,788
Soaps and cleaning preparations.....	1,146	12,413	1,085	11,427
Iron and steel products.....	468	8,242	542	9,774
Glass.....	609	9,727	350	5,744
Enamelling materials.....	350	5,250	400	6,000

According to the United States Bureau of Mines Minerals Year Book for 1940, an interesting cooperative venture is the Western North Carolina Feldspar Market established recently at Sylva, N.C. A nonprofit organization, sponsored by the Sylva Chamber of Commerce, Feldspar

Market Committee, A. F. Clouse, chairman, it is modeled somewhat after the pattern of the farm cooperatives. The object is to encourage development of the feldspar deposits in Swain, Macon, and Jackson Counties by supplying a ready cash market for producers in this region. The plan provides for the purchase of feldspar from many small miners, sorting and blending of the spar, and shipping in carlots. A site convenient to highway and railroad has been procured, and arrangements have been made for buyers representing different companies to be present on designated periodic "feldspar-market" days. The farmers or other small producers are then assured a fair competitive price for their feldspar. According to a recent informant the venture seems to be functioning successfully, and the erection of a grinding mill is under consideration.

Feldspar Prices (October, 1939 to May 1, 1941)—UNITED STATES—Per ton, f.o.b., North Carolina, potash feldspar, 200 mesh, white, \$17 in bulk; soda feldspar, \$19. F.O.B. Maine, potash feldspar, white, 200 mesh, \$17, in bulk. Granular glass spar, white, 20 mesh, F.O.B. North Carolina, \$12.50 in bulk; semi granular, \$11.75; soda feldspar, 200 mesh, white, \$19. Virginia, No. 1, 230 mesh, \$18; 200 mesh, \$17; No. 17 glassmakers', \$11.75; No. 18, \$12.50. Enamellers, \$14 to \$16. Quotations on Spruce Pine, N.C., or Keene, N.H., basis. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

"Canadian Chemistry and Process Industries", Toronto, published feldspar quotations March, 1941, as follows: Feldspar, pottery, ground, 200 mesh, F.O.B. mill, carlots, ton—\$17.00; feldspar rock, F.O.B. mill, carlots, ton, \$5 to \$7.50.

NEPHELINE-SYENITE

Production of nepheline-syenite in Canada during 1940 was valued at \$117,849 compared with \$140,148 in the preceding year. The output in both years came from properties located in Eastern Ontario.

The following information relating to nepheline-syenite is abstracted from report No. 791 issued by the Bureau of Mines, Ottawa: "Nepheline-syenite is an igneous rock consisting of a mixture of the feldspathoid mineral nepheline (or nephelite), a silicate of alumina and soda, and varying amounts of soda and potash feldspars. It is used in the ceramic trade (at present mainly in the glass industry) as a substitute for straight feldspar.

"Interest in the material as an industrial mineral or rock is of recent date, the first production being in 1936, when Canadian Nepheline Ltd., opened a quarry at Blue Mountain in Methuen township, Peterborough county, about 25 miles northeast of Lakefield, and erected a mill at Lakefield to crush and process the rock for market."

During 1940 the mineral was shipped by the Canadian Flint and Spar Co. Ltd. from the Bentley mine, Dungannon township, Hastings county; by the American Nepheline Corp. Ltd., from Methuen township, Peterborough county; and by the Temagami Development Company Ltd., from the Morrison property, Dungannon township, Hastings county.

The potential nepheline-syenite reserves of the Central Ontario region are undoubtedly very large, the Blue Mountain occurrence alone being a massive body about eight miles long and consisting in a large part of such rock. Numerous small outcrops are known in the Bancroft and adjacent areas to the north.

Table 174.—Production of Nepheline-Syenite in Canada*, 1936-1940

Year	Quantities	Value
		\$
1936.....	(a)	(b) 37,426
1937.....	(a)	121,481
1938.....	(a)	142,737
1939.....	(a)	140,148
1940.....	(a)	117,849

* Produced in Ontario only.

(a) Quantity not published.

(b) First commercial production in Canada.

Nepheline-syenite used in Canada during 1939 in the manufacture of glass totalled 3,472 tons valued at \$58,629. Corresponding consumption in 1940 was 4,233 tons worth \$69,619.

QUARTZ (SILICA)

The production of natural silica or quartz in Canada during 1940 totalled 1,858,302 short tons valued at \$1,203,527 compared with 1,582,935 tons at \$1,100,214 in 1939. Output of primary silica products by the Canadian Quartz Mining industry includes crude and crushed dyke quartz, quartzite, and natural silica sands and gravels. The mineral in one or more of the forms thus defined was produced during 1940 in Nova Scotia, Quebec, Ontario and Saskatchewan. Shipments of silica in Nova Scotia were made to steel plants largely for the making of silica brick. In Quebec high grade silica sands were produced for the manufacture of glass and chemicals while a considerable tonnage of these same sands was sold for sand-blasting and various other purposes; in the same province relatively large quantities of crushed quartzite were mined and milled for the manufacture of silicon carbide and other products. During the year the plant of Canadian Kaolin Silica Products Ltd., located at St. Remi d'Amherst, Que., was destroyed by fire. The greater part of the tonnage of silica shipped in Ontario during 1940 represented material intended for use in the production of silica brick and ferro-silicon and for the fluxing of nickel-copper ores. Quartz production as recorded for Saskatchewan represented low-grade natural silica sands or gravels shipped as flux to the Flin Flon Smelter of the Hudson Bay Mining and Smelting Co. Ltd.

The price per ton of the several grades of silica varies greatly depending on its purity and on the purpose for which it is to be used. Silica, on the whole, is a comparatively low-priced commodity, and therefore the location of a deposit with respect to markets is of great importance. According to a report issued by the Bureau of Mines, Ottawa, the larger markets for silica are in the provinces of Quebec and Ontario, and any new deposits being opened up should be within economic reach of either Montreal or Toronto.

Imports into Canada during 1940 of silex or crystallized quartz, ground or unground totalled 4,149 short tons valued at \$56,814; imports of silica sand for glass, carborundum and steel and filtration plants, etc., in the same year, amounted to 278,727 short tons worth \$556,683.

Table 175.—Production in Canada of Quartz, 1939 and 1940

	1939		1940	
	Short tons	Value	Short tons	Value
		\$		\$
PRODUCTION* (SHIPMENTS)—				
Nova Scotia.....	10,574	18,927	8,755	15,670
Quebec.....	104,827	369,172	109,090	321,891
Ontario.....	1,333,342	665,148	1,581,367	810,285
Saskatchewan.....	134,192	46,967	159,090	55,681
Canada.....	1,582,935	1,100,214	1,858,302	1,203,527

* Includes both crude and crushed quartz and quartzite, silica flux and natural silica sands.

Table 176.—Production* (Use) of Natural Low Grade Silica and Silica Gravel as Non-Ferrous Smelter Flux 1939-1940

	1939		1940	
	Tons	\$	Tons	\$
Ontario.....	1,195,558	418,445	1,403,268	491,144
Saskatchewan.....	134,192	46,967	159,090	55,681
Canada, Total.....	1,329,750	465,412	1,562,358	546,825

* Included in totals shown in Tables 175 and 177; also complete data for production of this material in Ontario previous to 1937 are not available.

Table 177.—Production of Quartz (Silica) in Canada, 1927-40

Year	Ton	\$	Year	Ton	\$
1927.....	233,984	496,346	1934.....	272,563	482,265
1928.....	282,522	523,933	1935.....	233,002	424,882
1929.....	265,949	561,527	1936*.....	1,046,649	597,781
1930.....	226,200	418,127	1937*.....	1,377,448	1,129,011
1931.....	195,724	303,158	1938*.....	1,380,011	961,617
1932.....	189,132	276,147	1939*.....	1,582,935	1,100,214
1933.....	185,783	297,820	1940*.....	1,858,302	1,203,527

* See footnote to Table 176.

Prices—UNITED STATES (May, 1941)—Silica, per ton, water ground and floated, in bags, f.o.b. Illinois: 325 mesh, \$21 to \$40 for 92 to 99½ per cent grades. Dry ground, air floated, 325 mesh, 92 to 99½ per cent silica, \$18 to \$30. Glass sand, f.o.b. producing plant, \$1.25 to \$5 per ton; molding sand, 50 cents to \$3.50; blast sand, \$1.75 to \$6. California: \$5 for quartz and \$2.50 for sand. Quartz rock crystals for fusing, all sizes, \$100 to \$150 per ton; prisms for piezo-electrical and optical use command premium. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

"Canadian Chemistry and Process Industries"—Toronto—quotations (March, 1941)—silica sand, various grades, carlots, ton \$8 to \$9.50. Silica quartz 99 per cent, 110-220 grade, carlots—to \$15 per ton. The price for the lower grades of crude quartz varies greatly according to purity and purpose of use.

Table 178.—Consumption of Quartz, Silica Sand, etc., in Canada, by Industries, According to Census of Industry Reports, 1939 and 1940

Industry	1939		1940	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
SILICA, SAND AND SILICA (including ground quartz)—				
Soaps and cleaning preparations.....	5,654	86,596	4,873	81,894
Acids and salts.....	16,265	76,229	19,256	90,545
Paints.....	748	21,511	823	26,309
Refractories.....	440	2,640	690	4,889
Roofing paper.....	1,420	7,877	1,833	10,261
Abrasives (Silica sand).....	32,661	161,514	45,982	221,925
Abrasives (Quartz).....	126	4,828	139	5,577
Glass.....	74,511	351,671	78,955	439,540
Enamelling materials.....	390	5,850	483	7,245
Products from imported clays.....	1,968	27,161	3,426	53,690
Foundry facings and supplies.....	102	714	72	934
Non-ferrous smelters†.....	1,329,750	465,412	1,562,358	546,825
Steel industry.....	28,360	183,756	41,232	302,171
Ferro-alloys.....	34,654	77,863	115,868	272,953
Total accounted for.....	1,527,049	1,473,622	1,875,990	2,064,758

NOTE.—Consumption values are costs at works.

† The quantities reported under this industry represent low grade natural silicious sands used for fluxing purposes. In addition to the quantities shown, a relatively large quantity of quartz and quartzite is consumed in the manufacture of silica brick.

Table 179.—Principal Statistics of the Feldspar and Quartz Mining Industry, 1939 and 1940

	ONTARIO (*) (b)		QUEBEC	
	1939	1940	1939	1940
Number of firms (a).....	17	17	26	27
Capital employed..... \$	598,255	604,687	992,760	1,569,571
Number of employees—On salary.....	15	14	20	19
On wages.....	169	176	134	191
Total.....	184	190	154	210
Salaries and wages—Salaries..... \$	19,915	22,508	30,995	18,137
Wages.....	165,721	189,583	113,539	147,026
Total..... \$	185,636	212,091	144,534	165,163
Selling value of products (gross)..... \$	922,576	1,098,104	430,095	410,895
Cost of fuel and purchased electricity..... \$	35,525	40,380	43,589	35,754
Cost of process supplies..... \$	74,217	88,521	25,390	49,862
Net value of sales..... \$	812,834	969,203	361,116	325,279

(*) In 1940 includes 1 firm operating in Nova Scotia and 1 in Saskatchewan (a total of 2). In 1939 includes 1 firm in Nova Scotia, 2 in Manitoba and 1 in Saskatchewan.

(a) Small shippers from whom reports were unobtainable and whose production is recorded from consumers' returns are sometimes not included in the total.

(b) Includes data relating to production of nepheline-syenite.

Table 180.—Capital Employed in the Feldspar and Quartz Mining Industry, in Canada, 1940

	Quebec †	Ontario
	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—		
Present cash value of the land (excluding minerals).....	561,416	114,145
Present value of buildings, fixtures, machinery, tools and other equipment.....	873,263	367,636
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	38,799	100,838
Inventory value of finished products on hand.....	24,406	5,510
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	76,687	11,558
Total.....	1,574,571	599,687

† Includes 1 firm in Nova Scotia.

Table 181.—Number of Wage-Earners on Pay Roll, by Months, 1939 and 1940

Month	1939	1940		
		Quebec	Ontario	Canada*
January.....	209	178	106	284
February.....	211	195	94	289
March.....	221	212	126	338
April.....	210	194	133	327
May.....	314	176	185	379
June.....	331	203	186	409
July.....	367	186	194	400
August.....	397	216	216	451
September.....	374	205	204	428
October.....	402	200	211	430
November.....	356	163	193	375
December.....	313	143	139	301

* Includes a few employees in some months in Nova Scotia.

THE GYPSUM INDUSTRY

(1) Primary Production—The Gypsum Mining and Quarrying Industry

Production (producers' sales and consumption) of gypsum in Canada during 1940 totalled 1,448,788 short tons valued at \$2,065,933 compared with 1,421,934 short tons at \$1,935,127 in 1939. The tonnage in both years represents various grades of crude gypsum and anhydrite shipped from quarries or mines together with the tonnage of calcined gypsum used in or shipped from quarry or "primary" plants. The quantity of the mineral produced in 1940 established an all-time high record in the history of the Canadian gypsum mining industry; the value, however, was exceeded annually during the years 1922-1931 inclusive.

Of the total output in the Dominion in 1940, Nova Scotia contributed 1,278,204 short tons valued at \$1,302,347; Ontario, 75,271 tons at \$313,512; New Brunswick, 52,218 tons at \$192,980; British Columbia, 19,987 tons at \$120,043 and Manitoba, 23,108 tons worth \$137,051. The total production of gypsum in Canada from 1874 to 1940, inclusive, totalled 29,702,191 short tons valued at \$62,171,430.

The quantity of crude gypsum mined in 1940 amounted to 1,494,576 short tons while the tonnage of anhydrite mined totalled 46,219 short tons. Crude gypsum calcined in primary or quarry plants totalled 156,372 short tons.

The following are the average prices per short ton recorded for total sales of various grades, including anhydrite, by the industry in 1940; Crude lump, \$1.10; crushed crude, \$1.03; ground crude, \$5.68; calcined (quarry) \$10.48.

In 1940 the number of firms reporting production was 9 and the gypsum quarries and mines in operation totalled 16. Some of the Canadian gypsum mining companies confine their operations in the Dominion to the production and shipment of crude gypsum or anhydrite, while others, in addition to marketing various grades of crude gypsum, produce a calcine for sale or for consumption in their own gypsum products plants.

Capital employed by Canadian gypsum mining companies totalled \$4,648,662 in 1940; employees numbered 694; salaries and wages paid amounted to \$717,666 and the total value of fuel, purchased electricity and process supplies used was recorded at \$418,339.

Gypsum is exported from Canada almost entirely in the crude form. The total value of gypsum, in all forms, exported in 1940 was \$1,372,386 compared with \$1,425,195 in 1939.

The Nova Scotia Department of Mines reviewed the Gypsum Mining Industry in that Province during 1940 as follows: "The Canadian Gypsum Company Limited at Wentworth, Hants County, is the largest gypsum operation in the Province. A number of quarries have been in operation on the property to make this production possible. The Retreat and Mudbank are new quarries located South of the Fraser and Cable quarries. A good quality of soft white gypsum is obtained from these two quarries. The Retreat was opened by driving a tunnel south from the floor of the Fraser quarry through 500 feet of anhydrite and putting a raise up through to the surface on a bed of soft white gypsum. The Mudbank quarry is reached from the south end of the Cables quarry by a 250 foot cut through anhydrite. Several glory holes have been opened. A new quarry has also been opened, the face of which is about 400 feet long and about 200 feet wide with a height of 60 to 70 feet; a good quality of white rock is obtained from these various quarries.

"The Connecticut Adamant Gypsum Company operated the Foul Meadow quarry at Cheverie, Hants County. It is located about two miles from the shipping pier. A face 18 feet high has been opened for about 500 feet and the overburden, which is about 15 feet in depth, is stripped by gasoline shovel. The gypsum is quarried and shipped to New Haven, Conn., as the demand arises. It is transported from the quarry to the shipping pier by means of motor trucks.

"The National Gypsum (Canada) Company carried out operations at Walton, Hants County. During the past few years a new quarry has been operated and a 35 foot face has been opened up for over 200 feet. The overburden which is not heavy is removed by a gasoline shovel and a portable air compressor with jack hammer drills are used to do the drilling. The quarried gypsum is transported $\frac{3}{4}$ of a mile by motor truck to the shipping pier at Walton. The same company continued their operations at Dingwall, Victoria County, and further increased their output during the past year. A new loading pier was completed and dredging operations carried out at Dingwall. A long concrete tunnel containing loading conveyor belt was constructed over which the crushed gypsum was stoned in readiness for shipment. This is the first departure from the covered storage shed universally used in the province. Two additional shovels were added to the quarry equipment, making a total of three. The quarry of the company located at Cheticamp was not operated in 1940.

"The Gypsum, Lime and Alabastine (Canada) Limited, continued operations at Baddeck Bay during the summer months. A quarry face 20 feet in height has now been opened over a length of 100 feet. The overburden is about 10 to 12 feet in depth. The gypsum is transported by truck a distance of several hundred yards to the plant at the shipping pier where it is crushed and stock piled.

"The Victoria Gypsum Co. Ltd. carried on quarrying operations at Little Narrows, Victoria County, on the Bras d'Or Lakes. The quarrying operations are located about 3,000 feet inland from the shipping pier and the maximum height of the gypsum is 20 feet.

"Gypsum was quarried in 1940 by the Windsor Plaster Company Limited from the old Mosher quarry on the property of the Windsor Gypsum Company. All gypsum quarried by the company is treated in their manufacturing plant in Windsor and the products sold in the form of selenite hardwall, bondwall, bug killer, dental plaster and plaster of Paris."

In New Brunswick gypsum mining operations were carried on at Plaster Rock from May to November by Donald Fraser. The mineral in the crushed state was shipped from the quarry to both Canadian and United States firms. At Hillsborough in the same province the property of Canadian Gypsum Company Limited was in continuous operation throughout 1940. Both surface and underground mining operations were conducted and milling was steady during the year. This company also operates a manufacturing plant at Hillsborough where an extensive variety of gypsum products are produced; this plant was also active from January to December.

At Caledonia, in Ontario, Gypsum, Lime and Alabastine, Canada, Limited, operated its mine, mill and manufacturing plant continuously throughout the year. Underground mining operations are carried on at Caledonia and the company produced a wide range of gypsum products. The company in its annual report for 1940 states:—"It is difficult at this time to predict with any degree of certainty what volume of business may be available for your company during 1941 and the extent to which it will be profitable. The erection of buildings for strictly war

purposes in the last nine months has lifted general construction to a higher level than in the years immediately preceding and a continuance of this program is apparently contemplated. In addition, the shortage of dwellings in the industrial centres where increased employment will be needed to produce war equipment is an urgent problem which doubtless will be solved either by private enterprise or governmental action. Gypsum products are essential to any type of housing construction—". The company in 1940 also operated its quarries located at Gypsumville in Manitoba and at Falkland, British Columbia. Milling and manufacturing were also conducted in these provinces in 1940. At Amaranth, Manitoba, Western Gypsum Products Ltd., operated its mine and mill from March 1 to November 30, underground mining is carried on at this property and the company, in addition to shipping crude crushed gypsum, manufactures various gypsum products. In British Columbia there was a relatively small tonnage of "gypsite" shipped from a property situated at Knutsford in the Kamloops district.

In Ontario, the mine, mill and manufacturing plant of the Canadian Gypsum Company Limited were in steady operation throughout the year. The property of this company is located at Hagersville; underground mining methods are used and a wide range of gypsum products is marketed.

Table 182.—Production in Canada, of Gypsum, 1939 and 1940

	1939		1940	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
SHIPMENTS BY GRADES—				
Crude (1)—Lump or mine run.....	27,912	34,406	21,101	23,201
Crushed.....	1,288,796	1,304,035	1,296,769	1,331,843
Fine ground.....	412	2,490	521	2,961
Calcined gypsum (2).....	104,814	594,196	130,397	707,928
Total.....	1,421,934	1,935,127	1,448,788	2,065,933
SHIPMENTS BY PROVINCES—				
Nova Scotia.....	1,298,618	1,340,830	1,278,204	1,302,347
New Brunswick.....	29,765	134,286	52,218	192,980
Ontario.....	59,440	260,792	75,271	313,512
Manitoba.....	15,961	98,578	23,108	137,051
British Columbia.....	18,150	100,641	19,987	120,043
Total.....	1,421,934	1,935,127	1,448,788	2,065,933
Total gypsum mined and quarried (1).....	1,532,423		1,540,795	
Total gypsum calcined (2).....	138,163		156,372	

(1) Includes anhydrite quarried in Nova Scotia which in 1940 totalled 46,219 tons.

(2) Not including gypsum calcined in plants located at Montreal and Calgary.

"The use of anyhrite in England for the manufacture of sulphuric acid, ammonium sulphate, cement and special plasters is increasing, and in normal times there is a good opportunity for the Canadian material in this market. Canada is fortunate in having extensive deposits, favourably situated for commercial exploitation, the material from which has been proved by tests carried out by the Department of Mines and Resources to be of excellent grade. Prior to 1937 the small production in Canada was exported principally for use as a fertilizer for the peanut crop, but it is possible that an industry will be started in this country in which our anhydrite may be used for the manufacture of sulphur or sulphur compounds as well as of special plasters, similar to those now being marketed in England." (Bureau of Mines, Ottawa).

Table 183.—Production (Sales) of Crude and Calcined Gypsum in Canada, 1931-1940

Year	Tons	Value
		\$
1931.....	863,752	2,111,517
1932.....	438,629	1,080,379
1933.....	382,736	675,822
1934.....	461,237	863,776
1935.....	541,864	932,203
1936.....	833,822	1,278,971
1937.....	1,047,187	1,540,483
1938.....	1,008,799	1,502,265
1939.....	1,421,934	1,935,127
1940.....	1,448,788	2,065,933

Table 184.—Annual Production of Gypsum in Canada, by Provinces, 1936-1940

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value†
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1936....	729,019	808,294	38,470	123,560	40,191	182,783	12,064	87,076	14,078	77,258	833,822	1,278,971
1937....	926,796	978,288	36,906	131,727	53,780	233,895	13,941	88,095	15,764	108,478	1,047,187	1,510,483
1938....	870,856	908,383	48,418	159,203	57,503	242,470	14,571	92,129	17,451	100,080	1,008,799	1,502,265
1939....	1,298,618	1,340,830	29,765	134,286	59,440	260,792	15,961	98,578	18,150	100,641	1,421,934	1,935,127
1940....	1,278,204	1,302,347	52,218	192,980	75,271	313,512	23,108	137,051	19,987	120,043	1,448,788	2,065,933

† Gross.

Table 185.—Consumption of Gypsum in Canadian Cement Industry, 1931-1940

Year	Tons	Year	Tons
1931.....	56,677	1936.....	25,447
1932.....	27,537	1937.....	33,691
1933.....	13,319	1938.....	51,975
1934.....	19,172	1939.....	31,492
1935.....	21,611	1940.....	38,903

Table 186.—Principal Statistics of the Gypsum Mining Industry in Canada, 1938-1940

	Nova Scotia	New Brunswick, Ontario, Manitoba, British Columbia	Total Canada
Number of firms—1938.....	5	5(*)	9
1939.....	7	3(a)	10
1940.....	6	3(a)	9
Capital employed—1938..... \$	4,395,198	2,930,214	7,325,412
1939..... \$	4,370,893	2,436,014	6,806,907
1940..... \$	2,406,561	2,242,101	4,648,662
Number of employees—On salary—			
1938.....	28	32	60
1939.....	29	37	66
1940.....	33	24	57
—On Wages—			
1938.....	324	239	563
1939.....	440	208	648
1940.....	389	248	637
Salaries and wages—Salaries—			
1938..... \$	48,398	55,068	103,466
1939..... \$	53,680	59,235	112,915
1940..... \$	60,374	51,048	111,422
—Wages—			
1938..... \$	251,516	173,045	424,561
1939..... \$	402,134	177,109	579,243
1940..... \$	369,090	237,154	606,244
Fuel and electricity—Cost—			
1938..... \$	63,102	86,047	149,149
1939..... \$	90,394	103,094	193,488
1940..... \$	76,224	118,740	194,964
Value of process supplies used—1938..... \$	58,443	31,714	90,157
1939..... \$	85,166	20,665	105,831
1940..... \$	194,005	29,370	223,375
Selling value of products (gross)—1938..... \$	908,383	593,882	1,502,265
1939..... \$	1,340,830	594,297	1,935,127
1940..... \$	1,302,347	763,586	2,065,933

(*) Includes 1 company also operating in Nova Scotia.

(a) Includes 2 companies also operating in Nova Scotia.

Table 187.—Capital Employed in the Gypsum Industry in Canada, by Provinces, 1940

	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
	\$	\$	\$
Capital employed as represented by—			
Present cash value of the land (excluding minerals).....	509,777	211,663	721,440
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,036,359	1,106,852	2,143,211
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	96,762	93,956	190,718
Inventory value of finished products on hand.....	148,561	39,567	188,128
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)...	615,102	790,063	1,405,165
Total.....	2,406,561	2,242,101	4,648,662

Table 188.—Number of Wage-Earners on Payroll or Time Record on the Last Day of Each Month or Nearest Work-day, 1939 and 1940

Month	1939		1940		
	Mine	Mill	Mine	Under- ground*	Mill
January.....	263	93	Surface 143	58	107
February.....	253	99	154	60	106
March.....	376	119	228	67	135
April.....	386	234	248	69	134
May.....	451	245	478	73	198
June.....	565	241	408	81	192
July.....	713	193	569	78	198
August.....	645	193	619	91	248
September.....	713	219	610	90	218
October.....	657	193	526	88	234
November.....	421	180	354	82	172
December.....	222	131	287	58	150

* Underground work confined to New Brunswick, Ontario and Manitoba.

(2) The Gypsum Products Industry

Nine Canadian factories, operated by four companies, manufactured gypsum products having a factory selling value of \$4,110,795 during 1940. This output was 29·5 per cent over the 1939 total of \$3,174,137 and 51·3 per cent over the 1938 value of \$2,715,894. The main products were gypsum wallboard, gypsum hardwall plaster, gypsum tile and gypsum blocks.

Capital employed in these nine manufacturing plants amounted to \$3,151,533 in 1940, including \$1,729,301, as the value of buildings and equipment, \$484,399 as the value of inventories at the year-end and \$937,833 as cash, bills receivable, etc. The average number of employees in 1940 was 362, to whom \$425,023 was paid in salaries and wages. Expenditures for fuel and electricity amounted to \$157,299, while materials used in manufacturing processes cost \$1,630,819

Table 189.—Materials Used in the Gypsum Products Industry, 1939 and 1940

Material	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Gypsum, crude.....	short ton	19,946	75,000	21,611	75,946
Gypsum, calcined (plaster of Paris).....	short ton	105,397	552,527	125,917	660,502
Paper.....	short ton	5,601	265,187	9,056	491,035
Starch or paste.....	short ton	112	9,875	262	18,803
Hair.....	short ton	418	35,636	111	17,933
Retarder.....	short ton	271	16,238	267	20,329
Sawdust or shavings.....	short ton	576	5,351	1,176	5,577
Containers etc.....	xxx		113,643		126,794
All other materials.....	xxx		167,306		213,900
Total.....	xxx		1,240,763		1,630,819

Table 190.—Output of the Gypsum Products Industry, 1939 and 1940

Products	Unit of measure	1939		1940	
		Quantity	Selling value at works	Quantity	Selling value at works
			\$		\$
Gypsum wallboard	sq. ft.	78,147,747	1,744,895	114,533,870	2,712,355
Gypsum hard wall plasters	short ton	69,853	859,154	69,889	897,932
All other products (*)			470,088		500,508
Total			3,174,137		4,110,795

(*) Includes gypsum tile, gypsum blocks, etc.

IRON OXIDES (OCHRE) MINING INDUSTRY

Production (Producers' Sales) in Canada of iron oxides and ochres, crude and refined during 1940 totalled 9,979 short tons valued at \$111,874 compared with 6,015 short tons worth \$88,418 in 1939. Of the 1940 output, 9,603 short tons valued at \$107,926 came from properties in the province of Quebec and the balance of 376 tons at \$3,948 represented crude material shipped from deposits located in British Columbia.

During 1940 iron oxides were produced in the province of Quebec at La Pointe du Lac, Alnaville, Les Forges, Red Mill and St. Adelphe. One firm produced refined products while crude material was shipped by other operators; the mineral in the crude form was consumed largely in the purification of manufactured gas.

The balance of Canadian iron oxide, production in 1940 originated in British Columbia where shipments of the mineral in the crude state were made from deposits located at Alta Lake; ochre was also mined and stock piled for drying at a property situated in the Windermere district.

Exports of iron oxides in 1940 totalled 4,060 tons valued at \$232,688; imports of ochres, siennas and umbers amounted to 1,818 tons worth, \$70,339.

Table 191.—Production in Canada of Iron Oxides, 1939 and 1940

	1939		1940	
	Quantity	Value	Quantity	Value
		\$		\$
PRODUCTION (SALES) (*)—				
Quebec	5,465	82,501	9,603	107,926
British Columbia	550	5,917	376	3,948
Total	6,015	88,418	9,979	111,874

(*) Includes both crude and refined.

Table 192.—Production of Iron Oxides in Canada, 1931-1940

Year	Quantity	Value
	Short tons	\$
1931	5,520	49,205
1932	5,240	46,161
1933	4,357	53,450
1934	4,959	66,166
1935	5,516	77,075
1936	5,854	69,630
1937	6,197	83,640
1938	5,821	71,769
1939	6,015	88,418
1940	9,979	111,874

The production of iron oxides in Canada since the first recording of statistics in 1885 to the end of 1940 totalled 297,36 short tons valued at \$2,979,838.

Table 193.—Consumption of Iron Oxides in Specified Canadian Industries, 1932-1940

Years	Coke and Gas		Paints, pigments and varnishes		Paints, pigments and varnishes	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons (a)	\$	Tons (b)	\$	Tons (c)	\$
1932.....	3,736	35,284	701	52,323	512	48,047
1933.....	2,734	29,076	504	43,826	491	43,671
1934.....	3,757	47,010	580	53,539	544	53,236
1935.....	3,701	46,204	990	77,758	564	56,219
1936.....	(d)	41,291	733	67,850	634	65,819
1937.....	(d)	40,414	890	81,709	566	49,082
1938.....	(d)	41,013	822	70,736	487	41,062
1939.....	(d)	35,417	882	80,274	523	46,134
1940.....	5,417	42,491	1,147	112,826	575	62,636

(a) Oxide and purifying materials. (b) Iron oxide pigments. (c) Ochres, siennas and umbers. (d) Data not available.

NOTE.—A classification of iron oxide colours is contained in the Bureau of Statistics annual Mineral Production report for 1936.

PRICES—CANADIAN—March, 1941 (x)

Iron Oxides—Red.....	2 cents to 7 cents per pound.
Yellow.....	5 cents to 7 cents per pound.
Brown.....	5 cents to 8 cents per pound.
Black.....	9 cents to 12 cents per pound.
Ochres.....	2 cents to 4 cents per pound.
Siennas.....	9 cents to 12 cents per pound.
Umbers.....	5 cents to 9 cents per pound.

(x) Canadian Chemistry and Metallurgy, Toronto.

PRICES†—UNITED STATES—March, 1941.

Iron Oxide per pound: standard (No. 1 quality) Spanish red, 3 to 5 cents nominal; domestic earth 2½ to 3½ cents.

Ochre per ton, f.o.b. Georgia mines; \$19 in sacks; \$22.50 in water-proof bags. Buff clay, 98 per cent through 325 mesh, \$19. F.O.B. Virginia, dark yellow, 300 mesh, 60 per cent ferric oxide, in jute bags \$19.50.

† Engineering and Mining Journal—Metal and Mineral Markets—New York.

Table 194.—Principal Statistics of the Natural Iron Oxides Industry in Canada, 1939 and 1940

	1939	1940
Number of firms.....	(b) 7	(b) 7
Capital employed..... \$	215,445	195,263
Number of employees—On salaries.....	(c) 6	(c) 5
On wages.....	32	41
Total.....	38	46
Salaries and wages—Salaries..... \$	7,936	7,896
Wages.....	18,980	30,946
Total..... \$	26,916	38,842
Selling value of products (gross)..... \$	88,418	111,874
Cost of fuel and purchased electricity..... \$	8,094	17,598
Cost of process supplies..... \$	100	435
Selling value of products (net)..... \$	80,224	93,841

(b) Five (5) producing in Quebec and two (2) in British Columbia. (c) One (1) female.

Table 195.—Capital Employed in the Iron Oxides Industry in Canada, 1940

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	34,373
Present value of buildings, fixtures, machinery, tools and other equipment.....	101,341
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	35,580
Inventory value of finished products on hand.....	19,969
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,000
Total.....	195,263

Table 196.—Wage-earners Employed, by Months, 1939 and 1940

Months	Number				Months	Number			
	1939		1940			1939		1940	
	Mine	Mill	Mine	Mill		Mine	Mill	Mine	Mill
January.....			12	24	July.....	32	14	44	16
February.....	3	17		28	August.....	45	14	43	17
March.....	3	20	9	26	September.....	42	15	31	19
April.....		20		23	October.....	19	19	25	17
May.....		20	11	22	November.....	11	20	15	20
June.....	28	17	38	16	December.....	6	20	6	21

THE MICA MINING INDUSTRY

The number of Canadian mica mine operators reporting shipments in 1940 totalled 57; capital employed by the industry amounted to \$259,168, and \$134,705 were distributed in salaries and wages to 218 employees. The total net value of shipments was estimated at \$209,316.

In 1940 phlogopite mica was shipped from properties chiefly located in the Hull-Buckingham district of Quebec and in Eastern Ontario from deposits occurring in the Kingston-Perth area. The production of sheet mica in Canada is almost wholly of the phlogopite or amber mica variety. It is derived almost entirely from adjacent sections of Ontario and Quebec, within an area extending roughly from Kingston, Ont., northeastward into Hull and Papineau counties, Quebec; a few scattered amber mica occurrences are also known in the Province of Quebec as far east as Quebec City.

Production of muscovite, or white mica, in Canada has been negligible; small amounts have been recovered occasionally as a by-product from feldspar mining in general, the proportion of sound, merchantable sheet mica in Canadian pegmatites has proved too low for profitable mining for this mineral alone. During 1940 muscovite mica was mined in Quebec at the Maisonneuve mine, St. Michel des Saints, Berthier township, and in Bergeronnes township, Saguenay county.

In a review of the Canadian Mica Trade, Mr. Hugh S. Spence of the Bureau of Mines, Ottawa, states—"Sheet mica is marketed in various classes, depending on the amount of preparation the mine-run material receives. Much of the Canadian output was sold formerly in the semi-rough form, termed "thumb-trimmed", but the trade now calls largely for "knife-trimmed", a much higher grade of product. Price is governed largely by dimensions of sheet, and rises rapidly for larger sizes. Quality, which is gauged by colour, softness, ability to split readily, as well as freedom from cracks, creases, pin-holes and inclusions of foreign mineral substances, is also highly important. Good di-electric strength is a prime consideration, but most amber mica, except perhaps the very dark, high iron varieties, possess this in the required degree. For heater use, the mica must be able to withstand a temperature up to red heat without puffing or swelling. The use of sheet mica is almost entirely for electrical insulation. It is cut or punched into an enormous variety of shapes and sizes, and in the form of splittings is bonded and pressed into large sheets that can be sawn, bored and machined into any desired article. Mica is used in making heavy-duty spark plugs for aeroplanes. Although the muscovite variety fills by far the largest share of the world mica demand, amber mica is essential for certain purposes, more especially where high-resistance is demanded. Although already drawn on extensively, Canadian reserves of amber mica are held to be still adequate to furnish important supplies, and any material price advance would probably result in a revival of mining and increased production. Canada shares the world market for amber mica with Madagascar. Fine flake or powdered mica has become an important industrial product, particularly in the United States, where a number of plants are engaged in its manufacture both by wet and dry systems of grinding. Most of this production goes to the roofing and rubber trade. New uses for the material include its combination with resin varnishes as a coating for foodstuff cans, and as a base in cleanser compounds. Increased interest is also being shown in its possibilities as a protective inert pigment in paints. Large amounts of wet-ground muscovite mica are consumed in wall paper manufacture.

"Mica prices are difficult to ascertain, owing to the lack of reliable market quotations and to the system of trade discounts obtaining. Quality also has such a bearing on value that the only satisfactory method of getting information is to submit samples to an accredited dealer for a quotation."

"In 1940, as a result of a threatened curtailment of mica exports from Madagascar, a strong export market developed for Canadian phlogopite—both knife-trimmed block and splittings—and dealers reported a heavier volume of sales than for some years past, with supplies at the end of 1940 lagging considerably behind orders. Despite this, little new mining was undertaken and there was little change in the number of operators as compared with other recent years. Most of the exports went to the United States, Great Britain, and Japan. The demand was particularly strong for hard, heat-resistant grades of block, suitable for heavy-duty aviation sparkplugs, the production of which grades is limited to a few mines. Efforts to stimulate output of this type of mica were made under the joint cooperation of the Bureau of Mines and the Metals Controller.

"The larger Canadian producers operate their own mica shops, but there are dealers who purchase rough-trimmed or mine-run mica from small operators and trim, grade, and split it for sale, either to other dealers and brokers, or to consumers. In smaller rural communities, much of the work, particularly splitting, is farmed out, the labour being performed mostly by girls on piece-work.

"An outstanding development was the discovery in Bergeronnes township, east of the Saguenay river, of a deposit of high-grade "ruby" muscovite, comparable in quality to the best Indian or Brazilian mica. This property which is owned by Eugene Simard, of Grandes Bergeronnes, came into production on a small scale in 1940. Some muscovite was also taken from the old Maisonneuve mine, in Berthier county, north of Joliette. Samples of large sheets of a good grade of stained muscovite, said to have come from a remote locality on the Peribonka river, 100 miles north of Lake St. John, were received by the Bureau of Mines at Ottawa, and similar samples were also furnished from a deposit near Wabowden, on the Hudson Bay railway in Manitoba. No developments have been reported, however, in either instance."

Table 197.—Production of Mica in Canada, by Provinces, 1930-1940

Year	Quebec		Ontario†		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
1930.....	430	61,729	740	34,275	1,170	96,004
1931.....	290	30,601	1,049	23,465	1,339	54,066
1932.....	41	4,076	268	2,752	309	6,828
1933*.....	256	39,060	666	9,371	944	49,284
1934*.....	322	85,967	618	9,059	998	97,071
1935.....	373	74,894	255	7,144	628	82,038
1936.....	272	63,123	529	11,433	801	74,556
1937.....	546	124,594	399	9,137	945	133,731
1938*.....	218	72,982	252	6,445	518	80,939
1939.....	424	122,243	634	25,078	1,068	147,321
1940.....	437	202,583	466	34,562	903	237,115

* Total for Canada includes 22 tons valued at \$853 produced in British Columbia in 1933, 58 tons valued at \$2,045 in 1934 and 48 tons at \$1,562 in 1938.

† In 1939 and 1940 includes production of mica schist in British Columbia.

Table 198.—Production of Mica in Canada, by Grades, 1939 and 1940

	1939			1940		
	Quantity	Value, f.o.b. shipping point	Price per pound	Quantity	Value, f.o.b. shipping point	Price per pound
	Pounds	\$	\$	Pounds	\$	\$
Rough cobbled.....	6,700	67	0.01	142,916	22,801	0.16
Knife-trimmed.....	92,333	38,370	0.42	158,200	80,836	0.51
Thumb-trimmed.....	68,181	6,832	0.10	144,232	17,383	0.12
Splittings.....	176,051	83,633	0.48	170,375	103,624	0.61
Scrap*.....	1,792,091	18,419	0.01	1,334,496	12,501	0.009
Total.....	2,135,356	147,321		1,950,219	237,145	

* Includes ground mica.

Table 199.—Consumption of Mica in Canada, by Industries, as Reported to the Annual Census of Industry, 1939 and 1940

	1939		1940	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
In Electrical Apparatus Industry.....		83,355		131,774
In Rubber Industry.....	94	9,423	100	10,984
In Roofing (a).....	316	19,271	219	6,934
In Mica Manufacturing Industry.....	186	17,079	199	28,235
Total accounted for.....		129,128		177,927

(a) Includes mica used in manufacture of wall paper and by coal tar distillation industries.

The total value of mica produced in Canada from the first official recording of mica statistics in 1886 to the end of 1940 amounted to \$8,078,815 and the greatest annual value was that of \$376,022 for the year 1920.

In preparation for the market, a considerable proportion of the crude mine tonnage sold is cobbled out and the mica split, trimmed and otherwise manufactured, with the result that the exports, though usually of smaller tonnage than the shipments from the mines, exceed them in value.

The following mica prices for May, 1941, are supplied by "Metal and Mineral Markets"—New York—Per ton, f.o.b. New Mexico, scrap, white, \$16; off color, \$12. Punch, white, for disks, per lb., 12c.; for washers, 10c. Per ton, f.o.b. New Hampshire, roofing mica, \$23; snow, \$35; 40 mesh white, \$40; 60 mesh, \$48; 100 mesh, \$60; 200 mesh, \$75. Clean dry mixed bench and mine scrap, \$16 to \$18. Per lb., f.o.b. North Carolina: Punch, 10 to 15c.; 1½ x 2 in., 45 to 60c.; 2 x 2, 60 to 85c.; 3 x 3, \$1.25 to \$1.50; 3 x 4 in., \$1.50 to \$1.75; 3 x 5, \$1.75 to \$2.25; 4 x 6, \$2.75 to \$3.50; 6 x 8, \$4.25 to \$4.95; 8 x 10, \$8.60. The above prices apply to No. 1 and No. 2 quality stock. Stained qualities take from 25 to 35 per cent discount. White North Carolina mica, 70 mesh, \$60 to \$80 a ton. Biotite, or black mica, \$15 a ton, unground. White, Georgia, 300 mesh, \$20.00; ground roofing, 20 mesh \$18.00; sericite, 300 mesh, \$15; mica schist, 20 mesh \$16.

The value of all mica exported from Canada in 1940 totalled \$273,804 compared with \$165,252 in 1939. The value of all mica imported into Canada in 1940 totalled \$133,081 compared with \$61,835 in 1939.

Table 200.—Principal Statistics of the Mica Mining Industry in Canada, 1939 and 1940

	1939	1940		
	Canada(*)	Quebec	Ontario	Canada(*)
Number of firms or operators.....	61	51	13	65
Capital employed.....\$	230,337	175,758	83,410	259,168
Number of employees—On salary.....	11	6	2	8
On wages.....	213	169	41	210
Total.....	224	175	43	218
Salaries and wages—Salaries.....\$	9,034	6,640	1,921	8,567
Wages.....\$	103,619	115,557	10,571	126,138
Total.....\$	112,653	122,213	12,492	134,705
Selling value of products (gross).....\$	147,321	202,583	31,962 (a)	237,145
Cost of fuel and electricity.....\$	7,570	7,953	1,618	9,571
Cost of process supplies used.....\$	11,444	16,271	1,987	18,258
Selling value of products (net).....\$	128,307	178,359	28,357 (a)	209,316

(*) Does not include general statistics for one operating plant in British Columbia for which data are not available.

(a) Includes \$2,600 production coming from British Columbia.

Table 201.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1940

	Quebec	Ontario	Canada†
	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—			
Present cash value of the land (excluding minerals).....	51,257	31,260	82,517
Present value of buildings, fixtures, machinery, tools and other equipment.....	35,570	26,545	62,115
Inventory value of minerals on hand, ore in process, fuel and miscellaneous supplies on hand.....	23,775	10,266	34,041
Inventory value of finished products on hand.....	4,245	4,291	8,536
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc)....	60,911	11,048	71,959
Total.....	175,758	83 410	259,168

† Does not include data for 1 property in British Columbia.

Table 202.—Number of Wage-earners on Payroll or Time Record on the Last Day of Each Month or Nearest Work Day, 1939 and 1940

Month	1939				1940		
	Mine	Shop (a)		Mine	Shop (a)		
		Male	Female		Male	Female	
January.....	45	23	38	68	62	19	
February.....	47	33	38	59	57	22	
March.....	42	32	38	49	73	21	
April.....	56	27	38	58	80	35	
May.....	80	40	38	86	72	5	
June.....	112	41	44	131	70	5	
July.....	133	44	74	158	69	7	
August.....	136	50	76	149	58	45	
September.....	130	65	71	128	65	41	
October.....	129	64	73	112	67	38	
November.....	100	64	83	105	67	30	
December.....	91	69	83	115	69	27	

(a) Includes outside workers.

VERMICULITE

(Bureau of Mines, Ottawa)

Vermiculite is essentially an American product, though occurrences have been reported in the Transvaal and Tanganyika, in Africa; in Western Australia; and in Russia. No important development of any of these deposits is known to have taken place as yet, but methods of processing the Transvaal material have been investigated in the laboratories of Witwatersrand University. Some American crude is exported for expanding to Great Britain and possibly to other countries. Improved demand for finer sizes, coupled with closer attention to preparation of crude, has recently resulted in an increased mine-yield from the Montana deposits, so that one ton of shipping products is now obtained from 2 tons of mine-run material.

No important occurrences of the mineral are known in Canada, though there have been unconfirmed reports of discoveries in the Albreda district, British Columbia. The occurrence of vermiculite seems to be restricted to areas of pyroxenite, in which the pyroxenite has been serpentinized and the phlogopite altered to vermiculite by acid intrusives. It is possible that vermiculite may be present in some of the similarly intruded mica-bearing pyroxenites of Ontario and Quebec.

The grade of crude vermiculite, based on its exfoliating properties, is distinctly variable in material from different sources, with resulting differences in the specific gravity, coherence, strength, and consequently in the insulating efficiency of the expanded product. The size of crude flakes is also important, the preference for house insulation being for plates about one-half an inch in diameter as they yield a product giving the maximum loose fill packing quality. About 60 per cent of the total sales is estimated to be used for this purpose.

Crude, cleaned and screened Montana vermiculite sold in 1940 at \$12 per ton, f.o.b. mine. The delivered cost, including freight and duty, laid down at eastern Canadian points is about \$30 per ton. North Carolina crude was quoted at \$9.50 per ton f.o.b. The retail price of expanded

house-fill material on the American market has recently ranged from 90 cents to \$1.35 per 24 pound bag of 4 cubic feet. Crude vermiculite weighs 60 pounds per cubic foot, or ten times the weight of the expanded product.

Crude vermiculite imports from the United States are subject to a duty of 10 per cent ad valorem, equivalent to \$1.35 per ton.

THE SALT INDUSTRY

Commercial production of common salt or sodium chloride in Canada during 1940 totalled 64,714 short tons valued at \$2,823,269 compared with 424,500 short tons at \$2,486,632 in 1939. In 1940 salt was produced in Nova Scotia, Ontario, Manitoba and Alberta and of the total Canadian output in 1940 Ontario contributed 412,401 short tons or 89 per cent. Statistics of Canadian salt production represent the recovery of the mineral from brine wells with the exception of Nova Scotia where the output comes entirely from the underground mining of rock salt deposits.

Of the total salt used or sold in 1940 there were 224,009 short tons or 48 per cent consumed directly by the producers themselves in the manufacture of caustic soda and other chemicals. Table and dairy grades sold were recorded at 75,166 short tons; 6,689 tons were reported as sold as highway salt while the balance of production totalling 158,850 short tons included common fine, common coarse and various other grades.

The number of Canadian firms reporting primary salt production in 1940 totalled 9; capital employed by the industry amounted to \$4,993,914, of which \$3,377,413 represented the value of buildings, machinery, etc., and \$260,598 the value of land. Employees numbered 586, including 70 female workers. Salaries and wages totalled \$836,506; \$321,589 were expended for fuel and electricity and \$40,198 for chemicals and other process supplies.

The "apparent" consumption of salt in Canada during 1940 is estimated at 570,876 short tons valued at \$3,319,115 compared with 531,473 short tons at \$2,917,713 in 1939.

Statistics relating to Canadian salt production are available only since 1886 and salt production in the Dominion since that year to the end of 1940 totalled 8,878,701 short tons valued at \$50,874,109.

Table 203.—Production of Salt in Canada, by Grades, 1939 and 1940

	1939			1940		
	Manu- factured	Sold	Value of salt sold (Not in- cluding containers)	Manu- factured	Sold	Value of salt sold (Not in- cluding containers)
	Tons	Tons	\$	Tons	Tons	\$
Table dairy and pressed blocks.....	68,629	70,390	1,223,433	73,907	75,166	1,421,832
Common, fine.....	85,921	84,106	503,589	93,831	94,817	549,410
Common, coarse.....	27,733	28,704	286,179	24,143	24,259	263,754
Highway salt.....	8,156	8,156	40,501	6,689	6,689	34,264
Land salt.....	288	268	1,697	673	708	4,528
Other grades.....	46,313	44,918	185,274	40,795	39,066	190,509
Brine for chemical works (Salt equivalent sold or used).....	187,958	187,958	245,959	224,009	224,009	358,972
Total.....	424,998	424,500	2,486,632	464,047	464,714	2,823,269
Value of containers.....			471,350			498,981
Grand total.....	424,998	424,500	2,957,982	464,047	464,714	3,322,250

Table 204.—Production of Salt by Provinces*, 1931-1940

Year	Nova Scotia		Ontario		Manitoba		Alberta	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1931.....	27,718	143,761	231,329	1,760,388				
1932.....	31,897	150,708	231,138	1,789,751	508	7,092		
1933.....	34,278	161,889	244,107	1,755,087	1,499	18,888		
1934.....	42,886	191,917	276,751	1,734,196	1,664	20,137		
1935.....	38,701	161,659	320,003	1,698,508	1,538	18,765		
1936.....	38,774	183,915	350,044	1,557,078	2,498	32,151		
1937.....	47,865	216,401	407,701	1,539,599	3,391	43,465		
1938.....	44,950	194,759	388,130	1,657,140	2,920	34,979	4,045	46,035
1939.....	47,885	213,029	370,843	2,200,189	2,453	35,888	3,319	37,526
1940.....	42,495	220,328	412,401	2,371,780	3,076	45,731	6,742	185,430

(*) In addition, Saskatchewan produced 231 tons valued at \$4,510 in 1933, 452 tons at \$8,703 in 1934 and 101 tons at \$2,046 in 1935.

"Soil stabilization with salt and clay for the foundations of highways and for a surface veneer for gravel roads is now firmly established and this use of salt showed a decided increase in the past few years. The development of soil stabilized bases for runways at Canadian air fields continued, and several air fields have been so prepared. The use of salt for mixing with sand, piled each fall at regular intervals along main highways, has increased greatly during the past few years, as it has been found that even in the coldest of weather the sand in piles which have been so treated remains loose and free flowing, thus allowing easy distribution on the icy roadway." (Bureau of Mines, Ottawa.)

"In New Brunswick, a salt basin was discovered in 1921, as a result of drilling in the vicinity of Goutreau, south of Moncton, on the east side of the Petitcodiac river. The extent of the basin was further determined when New Brunswick Gas and Oilfields, Limited, in drilling at Weldon on the west side of the Petitcodiac river, penetrated over 1,500 feet of salt formation. This was the second drill hole to strike salt on this side of the river. The top of the rock salt was 1,473 feet below the surface. During 1939 still another drill hole passed through the same salt formation, the thickness, however, being only about 100 feet, indicating that the northern edge of the basin is being approached. Altogether, six drill holes have penetrated the salt so that a deposit of salt over 1½ miles wide and four or more miles long is already indicated, the greatest thickness so far encountered being 1,500 feet. There are, therefore, many millions of tons of salt in this basin, available for future development. The possibility of developing this deposit for production of salt is being seriously considered.

"Near Amherst, Cumberland county, Nova Scotia, a well drilled a number of years ago by Imperial Oil, Limited, in a search for oil and gas, penetrated 3,200 feet of alternating beds of salt, anhydrite, dolomite, limestone and shale, the salt constituting 45 per cent of the whole. Salt was first met at a depth of 920 feet, and one bed more than 480 feet in thickness contained over 90 per cent sodium chloride. The apparent great thickness of the salt may be due to the steep dip of the beds." (Bureau of Mines, Ottawa.)

Table 205.—Production of Salt in Canada, 1931-1940

Year	Tons	\$
1931.....	259,047	1,804,149
1932.....	263,543	1,947,551
1933.....	280,115	1,939,874
1934.....	321,753	1,954,953
1935.....	360,343	1,880,978
1936.....	391,316	1,773,144
1937.....	458,957	1,799,465
1938.....	440,045	1,912,913
1939.....	424,500	2,486,632
1940.....	464,714	2,823,269

World production of salt in 1938, the last year for which complete data are available, was computed at 32,000,000 long tons by the Imperial Institute, London. Of this quantity, the British Empire accounted for 5,200,000 long tons or 16.2 per cent. In the order of output, the

United Kingdom, India and Canada were the largest Empire producers of the mineral. The leading producers among the foreign countries were the United States, Russia, China, Germany, France, Italy, Poland, Roumania, and Manchoukuo; the total figure for world output included rock salt, brine (wells) salt, and sea salt. In 1937 production in Germany totalled 3,312,128 long tons; in Great Britain 3,083,755 and in France 2,301,151.

Table 206. Available Statistics on Consumption of Salt, in Specified Canadian Industries, 1939 and 1940*

Industries	1939		1940	
	Quantity used	Cost at works	Quantity used	Cost at works
	Pounds	\$	Pounds	\$
Fish canning and curing (factories only).....	42,939,300	212,325	47,546,400	273,818
Slaughtering and meat packing.....	77,119,352	405,238	94,220,916	588,536
Acids, alkalies and salts—Brine (salt content) and dry salt.....	333,004,000	331,797	415,425,401	541,914
Soaps and cleaning preparations.....	4,215,720	17,386	4,926,412	18,661
Dyeing, cleaning and laundry work.....	5,105,994	38,403	5,070,363	42,354
Dyeing and finishing of textiles.....	2,263,589	11,640	3,162,844	14,181
Artificial ice.....	1,782,233	7,685	457,096	3,245
Abrasives—artificial.....	520,000	2,265	786,000	4,002
Waterworks.....	3,888,000	(a)	1,000,000	(a)
Leather tanneries.....	12,514,496	55,389	14,301,972	67,025
Pulp and paper mills.....	25,652,000	87,385	25,258,000	96,351
Stock and poultry foods.....	5,428,000	42,439	5,278,000	44,247
Bread and other bakery products.....	15,730,960	144,129	12,744,255	153,264
Fruit and vegetable preparations.....	9,999,069	68,956	9,377,683	70,918
Biscuits, confectionery, etc.....	1,485,960	13,222	1,648,845	16,487
Foods, breakfast.....	1,528,023	10,207	1,165,733	8,630
Sausage and sausage casings.....	564,139	6,016	635,106	6,524
Ice cream industry (b).....	1,680,840	12,154	1,508,345	8,682
Breweries.....	412,823	3,434	548,811	5,304
Malt and malt products.....	258,623	1,173	228,100	1,257
Macaroni, vermicelli, etc.....	109,337	1,074	100,506	943
Ice cream cones.....	9,010	91	3,959	125
Foods, miscellaneous, including coffee, tea, etc.....	1,642,581	15,432	1,868,795	19,774
Butter and cheese.....		122,786		190,729
Starch and glucose.....	455,019	1,607	482,783	2,102
Animal oils and fats.....	180,000	760	314,000	1,400
Condensed milk.....		658		670
Woolen textiles.....		950		

(*) In addition, large quantities of salt are used on highways.

(a) Value not compiled.

(b) Not available.

Table 207.—Principal Statistics of the Salt Industry in Canada, 1938-1940

	1938	1939	1940
Number of firms†.....	9	9	9
Capital employed..... \$	4,270,795	4,447,204	4,993,914
Number of employees—On salary.....	115	113	120
On wages.....	447	434	466
Total.....	562	547	586
Salaries and wages—Salaries..... \$	278,478	285,023	299,521
Wages..... \$	508,242	456,713	536,985
Total..... \$	786,720	741,736	836,506
Selling value of products (gross)..... \$	2,489,719	2,957,982	3,322,250
Cost of purchased process materials..... \$	30,369	37,161	40,198
Cost of fuel and electricity..... \$	278,711	276,267	321,589
Value of containers..... \$	576,806	471,350	498,981
Net value of sales..... \$	1,603,833	2,173,204	2,461,482

† 6 in Ontario; 1 in Nova Scotia; 1 in Manitoba; 1 in Alberta.

Table 208.—Capital Employed in the Salt Industry in Canada, 1940

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	260,598
Present value of buildings, fixtures, machinery, tools and other equipment.....	3,377,413
Inventory value of materials on hand, salt in process, fuel and miscellaneous supplies on hand.....	331,157
Inventory value of finished products on hand.....	78,478
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	946,268
Total.....	4,993,914

Table 209.—Wage-earners, by Months, 1939-1940 (On 15th or nearest representative date)

Month	1939	1940		
		Male		Female
		Surface	Underground	Surface
January.....	440	353	50	28
February.....	426	361	52	26
March.....	407	365	51	26
April.....	424	387	49	27
May.....	439	402	55	33
June.....	459	394	53	30
July.....	460	415	51	27
August.....	416	427	49	27
September.....	431	407	53	30
October.....	458	395	53	35
November.....	449	407	52	33
December.....	408	367	1	28
Average.....	434	389	47	30

TALC AND SOAPSTONE INDUSTRY

The value of crude and refined talc and soapstone sold by Canadian producers of these minerals in 1940 totalled \$229,639 compared with a corresponding value of \$170,066 in 1939. Production of soapstone in 1940 came entirely from the eastern townships of the province of Quebec, while the output of higher grade talc represented shipments of the mineral made chiefly from deposits occurring near Madoc, Hastings County, Ontario. A relatively small quantity of talc has been shipped from a property located at Anderson Lake in the Lillooet mining district of British Columbia; however, no commercial shipments of domestic talc were reported in this province during either 1939 or 1940.

The talc of the Madoc area is of foliated type, has a good white colour, and occurs as a series of vertical veins or bands in white crystalline dolomite. Near Broughton, in Quebec, crude lump talc, from a band cutting the soapstone body, and soapstone waste are shipped to a Montreal grinding plant. In addition to its use as a furnace material, Quebec soapstone is utilized in the manufacture of stoves, mantels, interior trim, ornaments, crayons, etc.

During the year under review, there were 8 firms reported as active in the industry, 6 in Quebec and 2 in Ontario; 7 of these made commercial shipments. Capital employed totalled \$319,398; employees numbered 94, and salaries and wages distributed amounted to \$80,879. Fuel and purchased electricity used were appraised at \$15,480 and the cost of explosives and other process supplies was reported at \$21,650. The net value of sales was estimated at \$192,509 as compared with \$147,734 in 1939.

Imports into Canada of talc and soapstone, ground or unground, totalled 3,719 short tons valued at \$66,238 in 1940, compared with 3,193 short tons at \$51,380 in 1939. Exports of talc from Canada in 1940 totalled 10,232 short tons valued at \$142,577, as against 7,185 short tons worth \$74,560 in the preceding year.

"Canadian Chemistry and Process Industries", Toronto, May, 1941 quotations for talc were—all grades f.o.b. Madoc, Ontario—per ton—fine blown—Red label \$30; No. 2 Green label \$18, 1 SS White label \$12; O Blue label \$10; 3A Blue label \$8.00. Imported Italian talc \$85-\$100.

"Metal and Mineral Markets", New York, May, 1941—Quotations for talc were: Per ton, carload lots, f.o.b. works, containers included unless otherwise specified: Georgia: 98 per cent through 200 mesh, grey, \$6; white, \$8, packed in 50 pound paper bags or 200 pound burlap bags. New Jersey: mineral pulp, ground, \$8.50 to \$10.50, bags extra. New York: Double air floated, short fibre, 325 mesh \$12 to \$15. Vermont: 99½ per cent through 200 mesh, extra white, bulk basis, \$10.00; 97 per cent through 200 mesh, medium white, \$9.50; packed in paper bags, \$1.25 per ton extra. Virginia: 200 mesh, \$4.75 to \$5.50; 325 mesh \$6.20 to \$7; crude \$4.

Table 210.—Production (Sales) in Canada, of Talc and Soapstone, 1939 and 1940

	1939		1940	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
PRODUCTION—				
Soapstone (Quebec) (a).....		41,471		74,905
Talc—Ontario.....	13,144	128,595	15,166	154,734
British Columbia—(Talc).....				
Total Canada.....		170,066		229,639

(a) Shipments usually include relatively small quantities of material classified as talc.

Table 211.—Production of Talc and Soapstone in Canada, 1934-1940

Year	Value	Year	Value
	\$		\$
1934.....	180,777	1938.....	144,848
1935.....	171,532	1939.....	170,066
1936.....	177,270	1940.....	229,639
1937.....	163,814		

Table 212.—Consumption of Talc in Canada, by Industries, as Reported in the Annual Census of Manufactures, 1939 and 1940

Industry	1939		1940	
	Short tons	Cost at works	Short tons	Cost at works
		\$		\$
Rubber Industry.....	707	13,121	855	17,587
Electrical Apparatus.....	194	5,636	222	5,551
Paints.....	2,350	59,565	2,683	73,490
Soaps and Cleansing Preparations.....	365	6,402	435	10,014
Toilet Preparations.....	364	18,872	455	20,024
Polishes.....	16	495	17	367
Products from Imported Clays.....	178	2,502	511	7,635
Prepared Roofing.....	3,170	34,307	4,822	48,906
Pulp and Paper.....	1,125	19,363	1,168	19,364

Table 213.—Principal Statistics of the Talc and Soapstone Industry in Canada, 1939-1940

	1939	1940
Number of firms.....	(a)6	(b)8
Capital employed.....	\$ 239,835	319,398
Number of employees—On salary.....	6	7
On wages.....	59	87
Total.....	65	94
Salaries and wages—Salaries.....	\$ 13,130	19,563
Wages.....	\$ 42,382	61,316
Total.....	\$ 60,512	80,879
Selling value of products (gross).....	\$ 170,066	229,639
Cost of fuel and purchased electricity.....	\$ 15,154	15,480
Cost of explosives and other process supplies.....	\$ 7,178	21,650
Selling value of products (net).....	\$ 147,734	192,509

(a) 5 firms in Quebec and 1 in Ontario.

(b) 6 firms in Quebec and 2 in Ontario.

Table 214.—Capital Employed, by Classes*, 1939-1940

	1939	1940
	\$	\$
Present value of lands, buildings, fixtures, machinery, tools and other equipment.....	195,518	284,993
Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand....	4,877	5,184
Inventory value of finished products on hand.....	11,634	6,518
Operating capital.....	27,806	22,703
Total.....	239,835	319,398

* By active firms.

Table 215.—Wage-Earners, by Months, 1939-1940

Month	1939	1940		
		Surface	Under-ground	Mill
January.....	35	19	15	17
February.....	38	20	16	17
March.....	48	18	15	17
April.....	36	18	14	15
May.....	54	39	14	19
June.....	71	35	17	22
July.....	72	43	17	23
August.....	76	46	17	27
September.....	78	56	28	26
October.....	82	90	35	23
November.....	80	84	35	28
December.....	63	60	35	33

MISCELLANEOUS INDUSTRIAL OR NON-METAL MINING INDUSTRIES

Included in this section are the following non-metallic minerals and mineral products:—

Barite	Grindstones	Silica Brick
Corundum	Kyanite	Sodium Carbonate
Diamonds	Lithium Minerals	Sodium Sulphate
Diatomite	Magnesitic Dolomite	Strontium Minerals
Fluorspar	Magnesium Sulphate	Sulphur (Pyrites)
Garnet	Natural Mineral Waters	
Graphite	Phosphate	

Canadian operators producing certain industrial minerals, and who are usually relatively few in number, have been segregated for statistical purposes into a single group designated as the Miscellaneous Non-Metal Mining Industry. Minerals or primary mineral products produced (or deposits developed) by this industry during 1940 included: barite, diatomite, fluorspar, graphite, grindstones, lithium minerals, magnesitic dolomite (crude and refined), mineral waters, phosphate, silica brick, sodium carbonate and sodium sulphate. For convenience, the sulphur content of pyrites shipped, sulphur recovered from smelter gas, and peat are recorded with the various miscellaneous minerals listed above; the value of sulphur production, however, is not included in the total for the miscellaneous non-metallic or industrial minerals as the value of this element is credited to the copper-gold-silver mining and non-ferrous smelting industries.

The number of firms reported as active in the industry during 1940 was 46; capital employed totalled \$2,491,527; employees numbered 547 and salaries and wages paid amounted to \$703,501. The cost of fuel, purchased electricity and process supplies used during the year was reported at \$649,393 and the gross value of production totalled \$2,116,756 compared with \$1,358,922 in 1939.

BARITE

Canadian production of barite in 1940 totalled 338 short tons valued at \$4,819, of which 25 tons worth \$162 came from deposits in Nova Scotia; 305 short tons at \$4,577 from Ontario and 8 short tons valued at \$80 from British Columbia. Production in 1939 came solely from Ontario and was valued at \$3,639.

In 1940 shipments of crude barite were made from a deposit located at Lake Ainslie, Cape Breton, Nova Scotia, by the North American Mining and Chemical Corporation Limited. Ontario production during the year under review represented shipments of the mineral in the crude state made by H. D. Eby from a property situated in Lawson township of the Elk Lake district, and by Benjamin Meen from the deposit of the Sudbury Basin Mines Limited, located at Tionaga. The production from these mines went chiefly to Canadian chemical plants. The output of barite credited to British Columbia in 1940 came from a deposit operated in the Fort Steele mining division by M. Gorrie.

Barite production in Canada during past years came largely from deposits in Nova Scotia, Quebec and Ontario and in recent years more particularly from deposits in the Lake Ainslie district, Nova Scotia. Prior to 1939 the last commercial shipments from Canadian deposits were made in 1933, in which year 20 tons valued at \$60 were produced and shipped at the Tionaga mine, Penhorwood township, Ontario.

Production of barite in Canada from 1885 to the close of 1940 totalled 41,688 short tons valued at \$309,068. Imports of barite in 1940 totalled 5,244,700 pounds valued at \$64,922.

During the summer of 1940 an important discovery of barite was made in the Pembroke district, Hants county, Nova Scotia by an engineer of Springer Sturgeon Gold Mines Limited. The deposit was diamond drilled and the Nova Scotia Department of Mines reported that a large reserve of barite, estimated at several hundred thousand tons was indicated; the property is within three miles of dock facilities at Walton and commercial production commenced in 1941. The Nova Scotia Department of Mines states that tests made by the Bureau of Mines, Ottawa, show the barite from this deposit meets the oil trade specifications in all respects. Specific gravity of the mineral is 4.5; a composite sample of the ore gave an analysis of 98.44 per cent barium sulphate.

Ground barite is used as a heavy, white, inert filler in many products, such as, paint, paper, rubber, oilcloth, linoleum, plastics, resins, and cloth. It is also used in the manufacture of glass and as a heavy medium in mud in the drilling of deep oil wells where high gas pressures are encountered. The most important single chemical product made from barite is lithopone, an intimate mixture of zinc sulphide and barium sulphate prepared by co-precipitation by double decomposition of solutions of barium sulphide and zinc sulphate; its chief use is as a white pigment.

According to *The Mineral Industry*, world production of barite in 1939 was in the order of 1,000,000 tons annually, almost half of which was from Germany, 30 per cent from the United States, 8 per cent from Great Britain, 5 per cent from Italy and 3 per cent from Greece; the remaining 4 to 6 per cent is scattered in small amounts among a number of still smaller producers.

Barite is a relatively low-priced commodity. Using the American trade as an index of recent price trends, market quotations in December, 1940, were as follows: crude ore \$6 to \$7 per ton according to grade, f.o.b. mines; prime white, floated Missouri, \$22-\$25 per ton, f.o.b., and off color grades, \$12 to \$16. Canadian Trade Journal quotations were \$47 per ton for prime white, and \$40 to \$44 for off-color grade.

Table 216.—Production of Barytes in Canada, 1926-1940

Year	Short tons	\$	Year	Short tons	\$
1926.....	100	2,307	1931.....	16	363
1927.....	56	1,268	1932.....	.....	.....
1928.....	127	2,847	1933.....	20	60
1929.....	105	2,341	1939.....	(a)	3,639
1930.....	66	1,484	1940.....	338	4,819

(a) Not available for publication.

Table 217.—Barytes and Blanc Fixe Used by the Canadian Paints, Pigments and Varnishes Industry in Canada, 1936-1940

Year	Barytes		Blanc Fixe *	
	Pounds	\$	Pounds	\$
1936.....	2,533,275	41,687	97,016	3,148
1937.....	2,630,366	42,821	125,743	4,136
1938.....	2,729,212	46,238	116,545	3,287
1939.....	2,884,985	49,659	139,408	4,455
1940.....	3,281,747	71,492	99,422	3,873

* Artificial barium sulphate.

CORUNDUM

Corundum is found in an area embracing several townships in Renfrew and Hastings counties in the province of Ontario. Corundum mining as an industry made its appearance there in 1900 and production reached a maximum in 1903. Shipments of the mineral in Canada during the period 1900-1921 totalled 19,524 short tons valued at \$2,104,251. No commercial shipments have been reported since 1921. No imports of corundum into Canada were shown in Customs reports for either 1939 or 1940. According to *The Mineral Industry*, the entire United States supply of corundum is obtained from imports, mainly from South Africa; imports into the United States in 1940 totalled 2,609 long tons valued at \$165,270. Corundum output in South Africa in 1940 totalled 4,211 tons. It was announced recently that what appears to be a large field of alluvial corundum was discovered in the north-eastern Transvaal near Leydsdorp in 1939.

Imports into Canada in 1940 of manufactures of emery or of artificial abrasives, n.o.p., were valued at \$58,472 of which those appraised at \$56,173 came from the United States. Imports of emery in bulk, crushed or ground were valued at \$72,708 in 1940.

Artificial corundum or "fused alumina" (Al_2O_3) is produced from calcined bauxite in steel-lined, water-cooled furnaces of the arc type. Canadian production of crude fused alumina in 1940 totalled 85,336 short tons valued at \$8,249,815.

DIAMONDS

Diamonds are not produced in Canada and Canadian consumption is derived entirely from imports which in 1940 were as follows: Diamond dust or bort and black diamonds for borers, value \$2,708,414; diamonds, unset, value \$1,915,305.

The Mining Journal, London, reported in December, 1940 as follows: "For the second time within a generation a general European war has disrupted the organization of the diamond cutting industry of the world. On the second occasion, however, the dislocation has been more complete than in World War No. 1 owing to the fact that on this occasion the occupation of the low countries by the Germans has included Holland as well as Belgium. Moreover, since 1918 diamond cutting has seen a remarkable development, especially these last few years, in the magnitude and importance of the use of the industrial diamond in many branches of the engineering industry. . . . Already the consumption amounts for industrial purposes to about two-thirds of the total annual diamond production, and the rapid development in the output of diamond tools is specially important in war time. Diamond cutting, as an industry, is commencing in Great Britain. World production of diamonds in 1938 totalled 11,455,000 carats valued at £7,680,000; of this output the British Empire contributed 3,417,000 carats worth £5,750,000, chiefly from the Union of South Africa, Sierra Leone, South West Africa and the Gold Coast. Among foreign countries, the Belgian Congo, Angola and Brazil were the principal producers."

In 1941 there were firms engaged in contract diamond drilling of Canadian mineral deposits compared with 32 in 1940. For further information see page 000.

DIATOMITE

Shipments of diatomite from Canadian deposits in 1940 totalled 248 short tons valued at \$7,957 compared with 301 tons at \$10,388 in 1939. Of the 1940 output, 241 tons worth \$7,786 originated in Nova Scotia and 7 tons (from stock) worth \$171 from the Quesnel district in British

Columbia. In Nova Scotia, shipments were made in 1940 from East New Annan by International Diatomite Industries Limited; this Company conducted mining operations during May and milling from January 1 to May 31 when all operations ceased; at Little River, Digby county, shipments of calcined diatomite were made by G. W. Wightman, this property was active throughout most of the year.

A report prepared by the Bureau of Mines, Ottawa, states:

"Very little change occurred in the consumption of diatomite used in the home industries during 1940. About 80 per cent of the diatomite now being consumed in Canada is in the form of filter-aids, 14 per cent is used for insulation, a 9 per cent increase over 1939, and the remainder is absorbed as a filler, concrete admixture, silver polish base, and in chemicals. Two companies are manufacturing diatomite insulation bricks. Amongst the recent applications, the use of diatomite in the paint and varnish industry, has demonstrated its advantages as a flattening agent and as an extender.

"Deposits containing medium quality diatomite are very common in some parts of Canada. Owing, however, to United States competition and to the, at present, comparatively small Canadian demand, only properly prepared diatomite of the highest quality can be successfully marketed on a scale sufficiently large to warrant the operation of a property and the erection of a plant.

"Indications are that not more than 25 per cent of the calcined material produced from the best quality Canadian deposit so far discovered, can be made into an efficient filter-aid that can compete with the imported product. Therefore, unless the remaining 75 per cent or more of the non-filter grades automatically produced can be sold, the cost of producing the filter-aid alone would be too high to be commercial. At present, the Canadian consumption of all non-filter grades is less than 600 tons annually, mainly in the form of made-up diatomite insulation bricks, the greatly increased production of which by Canadian firms is necessary before the Canadian diatomite industry can be profitable.

"Prior to the war, England consumed about 50,000 tons of diatomite annually, which included a substantial tonnage of Damish "Moler" for insulation purposes. Since May, 1940, exports to England from Canada of all non-filter grades have been stopped owing to the lack of shipping space for this very bulky and non-critical material. England is, however, now importing from the United States at the rate of about 4,000 tons annually of the highest quality filter-aid only.

"The United States, which contributed about 50 per cent of the world's output, had 15 producers in 1940. The total sales were estimated at 125,000 short tons, about the same as in 1939. The largest of the 25 other world producers are Denmark, Germany, Japan, Algeria, and Northern Ireland, in order of their importance, each producing over 5,000 tons annually.

"The present price in Canada varies from \$30.00 to \$75.00 per ton for insulation and filtration; up to \$200.00 in small lots for material suitable for polishes; imported insulation bricks vary from \$85.00 to \$140.00 per 1,000 according to grade and density."

Imports into Canada in 1940 of diatomaceous earth or infusorial earth, ground or unground, totalled 8,242,200 pounds valued at \$133,876 compared with 8,613,900 pounds at \$128,808 in 1939; the 1940 imports came entirely from the United States.

Table 218.—Production of Diatomite in Canada, 1927-1940

Year	Short tons	\$	Year	Short tons	\$
1927.....	266	6,650	1934.....	1,372	54,910
1928.....	368	8,960	1935.....	823	33,140
1929.....	429	10,330	1936.....	615	13,650
1930.....	554	13,247	1937.....	643	18,606
1931.....	1,610	32,789	1938.....	398	13,842
1932.....	1,496	29,509	1939.....	301	10,388
1933.....	1,789	36,648	1940.....	248	7,957

The total Canadian output of diatomite since 1896 when it was first produced in the Dominion, to the end of 1940, totalled 22,276 short tons valued at \$514,655.

Table 219.—Consumption of Infusorial Earth by the Canadian Sugar Refining Industry, 1932-1940

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1932.....	2,577,585	73,309	1937.....	4,586,786	95,532
1933.....	2,507,469	70,191	1938.....	4,908,597	101,473
1934.....	2,562,552	69,116	1939.....	4,819,811	105,711
1935.....	4,307,142	96,560	1940.....	4,984,362	112,369
1936.....	4,375,999	98,954			

FLUORSPAR

Production of fluorspar in Canada from 1929 to 1939 has been confined to the Madoc area, Hastings county, Ontario. Fluorspar was formerly produced at the Rock Candy mine in British Columbia by the Consolidated Mining and Smelting Company of Canada, Limited; production in 1929 from this mine totalled 17,800 short tons valued at \$267,000. Following the erection of a large fertilizer plant at Trail, the recovery of by-product fluorine from phosphate rock has obviated the necessity of employing fluorspar as a source of fluorine by the Consolidated Mining and Smelting Company of Canada, Ltd.

In 1940 the North American Mining & Chemical Corporation Limited shipped 17 tons of fluorspar to steel mills from a deposit located in the Lake Ainslie area, Cape Breton, Nova Scotia. The largest Canadian shipper in 1940 was the Dominion Fluorspar Company, Limited, which operated a property in the first concession of Madoc township, Hastings county, Ontario; this company was active from January 1 to December 19; shipments from Madoc township were also made in 1940 by Chas. A. Storlosar, and in Huntingdon township, in the same county, shipments of milled grades of the mineral were reported by the Moira Fluorspar Mining Syndicate Limited. The only other Canadian production in 1940 consisted of a relatively small tonnage of crude ore shipped by Wm. E. Clark from a deposit located in Cardiff township, Haliburton county, Ontario.

The Bureau of Mines, Ottawa, reported that a discovery of fluorspar associated with metallic sulphides was made in Montbeillard township, in the Rouyn-Noranda district, Quebec, and Cook Copper & Fluorite Corporation Limited was formed to develop the property. According to the Bureau of Mines, Ottawa, the recent interest in Canadian fluorspar has been prompted largely by war demand for domestic steel trade, the requirements of which have been running at about 10,000 tons a year. Fluxing gravel or lump grades for metallurgical use is usually sold on a specification of 85 per cent CaF_2 with not over 5 per cent silica; it should contain not over 15 per cent fines; much lower grade material is, however, usable, provided it contains no excess of objectionable impurities, though the price commanded would be below the regular market level for standard spar. Regular metallurgical-grade fluorspar (imported) sold in 1940 at about \$21 per long ton delivered, while domestic 65 per cent grade was quoted at about \$18 per short ton. Ceramic (glass and enamel) grades call for not less than 95 per cent CaF_2 , with a maximum of 3 per cent silica and 0.12 per cent iron (Fe_2O_3). The material requires to be offered in various mesh sizes, from coarse to extra fine. American quotations for this grade at the end of 1940 were \$32.60 per ton in bags, f.o.b. Illinois mines.

Imports of fluorspar into Canada in 1940 totalled 30,311 tons valued at \$628,719 of which 12,722 tons worth \$290,674 came from Newfoundland and 11,787 tons at \$256,039 from the United States.

Table 220.—Production of Fluorspar in Canada, 1931-1940

Year	Short tons	\$
1931.....	40	620
1932.....	32	464
1933.....	73	1,064
1934.....	150	2,100
1935.....	75	900
1936.....	75	900
1937.....	150	2,550
1938.....	217	3,906
1939.....	240	4,995
1940.....	4,454	59,317

Table 221.—Consumption of Fluorspar in Canada, by Uses, as Reported to the Annual Census of Industry, 1939 and 1940

Industries	1939		1940	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
Steel furnaces.....	7,972	122,778	15,307	327,187
Chemicals (acids, alkalies and salts).....	6,395	154,446	8,524	236,924
Glass.....	131	5,330	140	6,353
Ferro-alloys.....	4	80	111	4,440
Enamelling and glazing.....	182	(a)	16	319
Total accounted for.....	14,684		24,098	575,223

(a) Not available.

GARNETS

A review of garnet in 1940 by the Bureau of Mines, Ottawa, states:

"Commercial garnet belongs to a group of complex silicate minerals, of which almandite, the brownish-red iron-aluminium silicate is generally considered the hardest and the best as an abrasive. Garnet is a rather common mineral constituent of certain rocks distributed throughout the Dominion and it usually occurs as a garnetiferous-gneiss, large areas of which are known in parts of Ontario and Quebec. At present, however, little garnet is produced in the Dominion, the only company in operation in 1940 being Canada Garnet, Limited, at Labelle, Quebec. Some prospecting was also done on a deposit about 40 miles northwest of North Bay, in Ontario.

"Garnet, crushed and suitably graded as to size, is used for making abrasive-coated papers and cloth, which in-turn are used mainly in the wood-working (hard woods) and to a lesser extent in the shoe leather industry. As artificial abrasives rather than those made from garnet are used in the surfacing of metals, the marked increase in this work arising from the war effort has not affected activities in the garnet industry to any appreciable extent.

"The specifications for garnet for use in the making of high quality abrasives are somewhat exacting. The individual crystals should be clear and free from embedded impurities and from minute factures. They should be of a deep wine-red colour, and not smaller than pea size, walnut size or larger being preferable. The garnet should be tough, but should yield sharp and angular grains when crushed. The deposit should be extensive and the garnet content should not be less than 25 per cent. It should also be close to rail transportation and industrial centres. Few, if any, of the hundred or more garnet deposits so far examined in Canada fulfil all of these requirements.

"Canada Garnet, Limited, completed the mill on its property at Labelle, but made no shipments of abrasive garnet, other than a few hundred pounds for trial. The company, however, sold about 88 tons of mixed garnet and rock valued at \$629 for use in sand-blasting.

"Between 90 and 95 per cent of the world output of garnet comes from the United States, Barton Mines Corporation, North Creek, New York, being by far the largest producer. Its product is regarded as the world standard abrasive garnet and its deposits are large. Total sales of the three active companies in the United States in 1940 amounted to 3,600 tons as compared with 4,056 tons, valued at \$278,538 in 1939.

"The price in the United States of the best quality concentrate from which grain is prepared for abrasive papers and cloths ranges from \$75 to \$80 a ton f.o.b. mines and of graded grain, \$90 a ton. Some sales of garnet fines, for use in the surfacing of plate glass, were made at about \$26.00 a ton delivered, and garnet for use in sand-blasting sold at \$30.00 a ton.

"Crude garnet ore or ungraded mixed concentrate enters the United States duty free, the duty on grain graded into separate sizes and specially prepared garnet being one cent a pound."

No imports of garnet, described as such, were recorded in Canada during 1939 or 1940; the mineral, however, may enter in the form of abrasive paper or combined with other abrasive imports, n.o.p. It has been reported that approximately 175 tons of graded garnet grains are imported annually into Canada. In 1939 the Canadian artificial abrasives industry used 155 short tons of garnets valued at \$25,737 compared with 98 tons at \$17,219 in 1938.

GRAPHITE

Canadian mine production of graphite during 1940 was valued at \$94,038 compared with \$61,684 in 1939. The output in 1940 as in the preceding year came solely from the Black Donald mine, Renfrew county, Ontario. Relatively small and intermittent shipments of graphite were also made from Quebec properties prior to 1935. No ore was mined at the Black Donald mine in 1940 and milling operations during the year represented the retreatment of some 3,000 tons of tailings. The mill was in operation from May 5 to December 31 and finished products included flake, dust and amorphous grades. Flotation is employed in the treatment of Black Donald ore.

The Bureau of Mines, Ottawa, in its 1940 review of the graphite industry states:

"World production of natural graphite of all grades, and including flake, crystalline (Plumbago), and amorphous, during the past decade has averaged about 140,000 short tons a year. Madagascar, Germany, Austria, and Czechoslovakia are the principal sources of flake graphite; Ceylon of crystalline; and Mexico and Korea of the amorphous variety.

"Graphite has a variety of uses in industry, but it is employed principally in foundry facings, lubricants, crucibles, pencils and crayons, paints, and stove polish. Using the United States as an index of the trend of consumption, the above industries took 63 per cent of the total graphite sales in 1938, the remainder going into minor, unspecified trades. Dry batteries, electrodes, and commutator brushes use important quantities, mostly amorphous or artificial.

"By the end of 1940, the war had not occasioned any serious shortage of graphite shipments to the American continent, and dealers' stocks were then estimated at about twelve months' supply. American importers, however, early in 1941 commenced to show concern over a threatened curtailment of shipments from Madagascar for the crucible trade, which consumes about 90 per cent of such imports. This involved the possibility that American crucible makers might be forced to revert to earlier practice and use Ceylon graphite, now largely discarded in favour of Madagascar flake.

"Graphite for United States consumption is mainly handled through large importing houses who supply the trade. Prices at the close of 1940, as reported by one such importer were: "Madagascar flake, 6½-8 cents per pound; Ceylon lump, 7-15 cents per pound; Ceylon chip, 5-10 cents per pound; Ceylon dust, 3½-8 cents per pound, all ex-dock, duty paid, New York."

Imports into Canada of plumbago, not ground or otherwise manufactured, were valued at \$24,380 in 1940 compared with \$13,384 in 1939. Imports of plumbago crucibles in 1940 were appraised at \$131,200 as against \$60,091 in the preceding year. Imports of plumbago ground and manufactures of, n.o.p. totalled \$179,677 in 1940 compared with \$86,944 in 1939.

Table 222.—Mine Production (Sales) of Graphite in Canada, 1931-1940†

Year	Short tons	\$	Year	Short tons	\$
1931.....	548	32,149	1936.....	(a)	88,812
1932.....	346	18,483	1937.....	(a)	125,343
1933.....	405	18,367	1938.....	(a)	41,590
1934.....	1,518	71,424	1939.....	(a)	61,684
1935.....	1,782	79,781	1940.....	(a)	94,038

The value of mine graphite produced in Canada from 1886 to the end of 1940 totalled \$3,762,647.

(a) Not published.

† Production from 1936-1940 came entirely from Ontario.

Table 223.—Consumption of Graphite or Plumbago in Canada, by Industries, as Reported to the Census of Industry, 1939 and 1940

Industry	1939		1940	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
Paints and varnishes.....	48	4,164	69	6,692
Polishes.....	39	4,667	43	4,698
Foundries.....	208	21,706	204	37,300
Acids and salts.....	23	6,815	116	34,044
Prepared foundry facings.....		4,653	198	12,836
Total Accounted for.....		42,005		95,570

GRINDSTONES AND PULPSTONES

Quarry sales of grindstones and other natural abrasive stones (sandstone) in Canada during 1940 totalled 341 short tons valued at \$14,543 compared with 304 short tons at \$15,278 in 1939. The shipments in 1940 included 18 short tons of sharpening stones valued at \$2,520 and 290 short tons of grindstones worth \$11,858. No pulpstones were produced in 1940 and the sharpening stones came entirely from a plant in New Brunswick. The grindstones sold during the year under review were made from both Nova Scotia and New Brunswick stone. Included as abrasives in the total figures of grindstone production in 1940 are 33 short tons of grinding pebbles valued at \$165; these were obtained from a deposit in southern Saskatchewan and were shipped to a feldspar grinding plant in the province of Quebec.

The Bureau of Mines, Ottawa, reports, in part, in its 1940 review of Grindstone Production as follows:

"The large-size Canadian grindstones are used mainly for sharpening pulp-mill and tobacco knives, and in the United States in the file, machine-knife, granite tool, and shear manufacturing industries. The small stones are used for scythe and axe grinding. Substantial competition from the artificial grinding wheel, and to some extent from foreign natural stones, are causes of the dwindling of this business.

"Good pulpstones are in demand, particularly for use in the large magazine grinders, but as known Canadian deposits containing thick beds of sandstone of the proper quality appear to have been worked out, production for the present has ceased. Added to this there is substantial and increasing competition from Canadian made artificial segmental pulpstones mainly of silicon carbide grit, there being at present nearly 500 of these stones in operation in the various Canadian pulp mills. The imported natural pulpstones come mainly from West Virginia, United States.

"The exports of these stones in 1940 were valued at \$4,149 as against a valuation of \$6,312 in the previous year. The imports which consisted chiefly of pulpstones, were valued at \$192,493 as against \$133,273 in the previous year. Most of these come from the United States."

In 1916 it was stated that included with the annual statistics of quartz was a small production of grinding pebbles obtained from near Jackfish, Ontario, on the north shore of Lake Superior, by the Canada Pebble Co., Ltd. These pebbles were used chiefly in the cement industry. It was also reported that considerable deposits of rounded quartzite pebbles, suitable for grinding purposes, were found on the Cypress Hills, south of Maple Creek, Southern Saskatchewan. During 1930 the production of grinding pebbles from the Jackfish deposits amounted to 560 tons; in 1925 the total was 105 tons and in 1926 only 64 tons. The Hedley Gold Mining Co. used pebbles obtained from Hedley, Similkameen district, British Columbia, in 1922. In 1940 a shipment of natural pebbles for grinding purposes was made from a deposit located at Gouverneur, Saskatchewan; these were consigned for experimental purposes to an Eastern Canadian feldspar grinding plant. Quartzite pebbles from beach deposits located some 35 miles from Sydney, Nova Scotia were tested by the Department of Mines, Ottawa, in 1919; the Nova Scotia Department of Mines report that the results from these tests indicated a better wear than from imported flint pebbles.

Table 224.—Production of Grindstones, Pulpstones and Scythestones in Canada, 1931-1940

Year	Tons	\$
1931.....	621	38,103
1932.....	328	15,735
1933.....	498	21,919
1934.....	987	46,478
1935.....	708	34,010
1936.....	569	24,724
1937.....	412	21,429
1938.....	306	16,198
1939.....	304	15,278
1940.....	341	14,543

Table 225.—Production of Natural Abrasive Stones, by Kinds, 1940

	Pulpstones		Sharpening stones		Grindstones	
	Tons	\$	Tons	\$	Tons	\$
Nova Scotia.....					53	2,378
New Brunswick.....			18	2,520	237	9,480
Saskatchewan.....			†33	165		
CANADA.....			51	2,685	290	11,858

(†) Grinding pebbles.

Table 226.—Consumption of Pulpstones by the Canadian Pulp and Paper Industry, 1931-1940

Year	Number for 2 ft. wood	Value	Number for 2-5 ft. wood	Value	Number for 4 ft. wood	Value
		\$		\$		\$
1931.....	226	72,588	225	71,760	285	337,580
1932.....	210	65,450	139	46,436	222	249,373
1933.....	321	98,475	95	31,945	199	223,635
1934.....	378	103,811	84	29,680	268	292,359
1935.....	417	116,501	52	20,297	237	243,805
1936.....	463	120,227	61	19,478	253	281,265
1937.....	392	123,598	84	21,700	230	382,084
1938.....	306	92,822	37	13,351	136	238,488
1939.....	242	60,622	60	22,443	203	238,620
1940.....	311	96,957	110	49,899	163	257,628

The Artificial Abrasives and Abrasive Products Industry

The factory selling value of all products made during 1940 by the manufacturers in Canada of artificial abrasives and artificial abrasive products amounted to \$15,324,693. This value represented a gain of 65 per cent over the total of \$9,275,143 for 1939.

There was no change in the number or location of the establishments which made artificial abrasives and their products in 1940, there being fourteen works in Ontario and two in Quebec. The average number of employees in the industry was 1,439, and payments in salaries and wages totalled \$2,261,495. Expenditure for manufacturing materials amounted to \$4,693,981 and \$1,208,439 was paid out for fuel and electricity. Capital investment in the industry totalled \$8,120,898, of which \$3,451,260 was the value placed on land, buildings and equipment.

Artificial abrasives were made by 4 plants in Ontario and 2 in Quebec. The output of these 6 works was valued at \$12,431,295 and included 85,336 tons of crude fused alumina at \$8,249,815; 24,562 tons of crude silicon carbide at \$3,053,047 and other products and by-products, such as, ferrosilicon, firesand, refractory brick, refractory cements, calcium boride, crude boron and boron carbide shapes. An average of 1,042 people were employed and salaries and wages totalled \$1,626,927.

Ten other plants were occupied chiefly in making abrasive products, such as, wheels, paper, pulpstones and sharpening stones; 9 made abrasive wheels and segments, 7 made sharpening stones and files, and 2 made abrasive cloth and paper. The value of all products made in these establishments was \$2,893,398, of which \$1,153,676 were for abrasive wheels and segments. The number of employees was 397 and payments for salaries and wages amounted to \$634,568.

Exports of crude artificial abrasives totalled 113,893 tons valued at \$7,601,090 in 1940, and the exports of wheels and stones were reported at \$37,742.

Imports of crushed or ground artificial grains were appraised at \$875,300 and manufactured grinding wheels at \$187,077 in 1940.

Table 227.—Products Manufactured 1939 and 1940

Product	1939		1940	
	Short tons	Selling value at works	Short tons	Selling value at works
		\$		\$
Crude silicon carbide.....	17,225	1,865,604	24,562	3,053,047
Crude fused alumina.....	51,118	4,565,569	85,336	8,249,815
Silicon carbide firesand, etc.....	416	10,034	868	34,649
Abrasive wheels and segments.....		1,117,689		11,838,558
Sharpening stones and files.....		96,217		116,411
Ferrosilicon.....	5,698	65,533	8,354	100,910
Other products (*).....		1,554,497		1,931,303
Total.....		9,275,143		15,324,693

(*) Includes abrasive cloth, abrasive paper, tiles, artificial pulpstones, artificial graphite, boron carbide, boron carbide shapes, calcium boride, fused magnesia, refractory cements, firebrick, etc., each of which was reported by only one or two companies.

Table 228.—Materials Used in Manufacturing, 1939 and 1940

Material	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Bauxite and pure alumina.....	short ton	60,441	1,440,406	100,163	2,369,165
Coal (not for fuel)—					
For fused alumina.....	short ton	244	1,398	326	1,992
For silicon carbide.....	short ton	5,029	31,442	4,749	30,961
For graphite.....	short ton			54	398
Coke (not for fuel)—					
For fused alumina.....	short ton	3,685	21,496	5,830	34,466
For silicon carbide.....	short ton	18,123	217,434	27,302	337,011
For graphite.....	short ton			407	4,734
Electrodes.....	short ton	986	119,845	1,607	193,715
Feldspar.....	short ton	45	1,368	68	2,056
Iron borings.....	short ton	5,993	47,996	9,427	108,351
Salt.....	short ton	260	2,265	393	4,002
Sawdust.....	short ton	6,155	16,149	7,687	21,717
Silica sand.....	short ton	32,661	161,514	45,982	221,925
Artificial abrasive grains.....	short ton	2,996	370,482	4,276	562,679
Natural abrasive grains—					
(a) Garnet.....	lb.	310,213	25,737	254,455	21,780
(b) Emery.....	lb.	91,721	5,254	146,405	10,383
(c) Quartz or flint.....	lb.	253,099	4,828	277,110	5,577
(d) Other.....	lb.	56,958	4,967	79,918	6,639
Bonding and bushing materials—					
Clay bonds.....	lb.	611,069	16,890	1,001,491	29,960
Silicate (quantity in equivalent solid form).....	lb.	10,898	426	10,130	362
Elastic mixture.....	lb.	17,227	4,493	29,887	11,022
Bakelite and synthetic resins.....	lb.	80,387	34,119	112,944	46,013
Lead for bushings.....	lb.	36,380	1,811	53,269	3,035
Cotton cloth.....			45,166		121,226
Kraft and rope paper.....			93,495		93,338
Containers and packing material.....			34,378		49,551
All other material.....			267,697		401,923
Total.....			2,971,056		4,693,981

KYANITE

Kyanite is usually a rock-forming mineral, and only rarely does it occur in large monomineralic masses as segregations in quartz-kyanite gneiss or schist. Indian kyanite is the most popular at the present time; the production in India commenced in 1924 and amounted to 24,787 tons in 1936. The mineral also occurs in Nyasaland, British East Africa and Western Australia.

The leading andalusite mine in the world is operated by Champion Sillimanite, Ind., in the White Mountains, California; this Company is a subsidiary of the Champion Spark Plug Co., Detroit, Mich.

None of the minerals, kyanite, sillimanite or andalusite are commercially mined in Canada at the present time and any imports of these minerals into Canada are not shown separately in the Canadian Customs classification. "Metal and Mineral Markets"—New York—June, 1941 quoted kyanite—per ton f.o.b. North Carolina and Georgia \$20.00 to \$32.00.

Kyanite production in the United States in 1940 was mainly in California and Virginia, with some in North Carolina and Georgia, the total output being 4,241 short tons valued at \$94,000. Imports into the United States in 1940 were 7,658 short tons, all from India.

LITHIUM MINERALS

Commercial production of Canadian lithium minerals was first recorded in 1937. These were made by the Lithium Corporation of Canada, Limited, from deposits located at Bernic Lake, near Pointe de Bois, Eastern Manitoba. For further details refer to chapter 5.

MAGNESITIC DOLOMITE

Canadian production of magnesitic dolomite was valued at \$897,016 in 1940. The value of the output in 1939 was \$474,418. Production is confined to the province of Quebec.

The annual review on magnesite by the Bureau of Mines, Ottawa, contains the following information:

"Magnesitic dolomite consisting of an intimate mixture of magnesite and dolomite is quarried at Kilmar and at Harrington East, in Argenteuil county, Quebec, and is processed for use as refractory materials. Products at present marketed include caustic-calcined magnesitic dolomite, dead-burned or grain material, bricks and shapes (both burned and unburned), finely ground refractory cements, and, in combination with chrome, the dead-burned material is used as an ingredient in certain other types of refractory. Magnesia products made in Canada from imported magnesite and magnesia include fused magnesia (artificial periclase), optical periclase, and "85 per cent magnesia" pipe covering.

"The recent discovery by the Bureau of Mines of deposits of a magnesium mineral known as brucite, at Rutherglen, Ontario, and at Bryson and Wakefield, Quebec, is considered a matter of importance. The brucite occurs as granules thickly disseminated through a matrix of crystalline limestone, and by a process developed in the Bureau of Mines laboratories, and described in a report recently issued by the Bureau, it is possible to recover these brucite granules in the form of magnesia of a high degree of purity, apparently at a cost that will enable it to compete with imported magnesia in Eastern Canada. The magnesia so obtained is suitable for the manufacture of high-grade basic refractories, magnesium metal, and various chemical compounds. Hitherto, magnesia of equal purity has not been available from any Canadian source, but has had to be imported from Asia, Europe, or the United States. Being an essential war commodity, supplies of magnesia are difficult to obtain during wartime, and a domestic source is of prime importance. At present the deposits are being investigated by several companies in co-operation with the Bureau of Mines, and early production of magnesia from them is expected.

"Magnesite is available in many countries. Russia is probably the world's greatest producer of magnesite, but almost all is for domestic use. For export, the magnesite is generally shipped in either the calcined or the dead-burned state.

"Magnesite is usually calcined before shipment and the resultant magnesia is used for the making of refractory products to withstand extremely high temperatures, for making oxychloride cement, and for magnesium metal. It is also the basis of a number of magnesium salts and has many minor uses. The world-wide demand for magnesium metal has greatly stimulated interest in deposits of magnesite. Although until three years ago almost all the world's magnesium was made from magnesium chloride brine and from waste water used in treating potash minerals, magnesite is now an important source of this light metal in Europe. Sea-water and magnesium chloride brine are the sources of all magnesium at present produced in the United States.

"Competing with magnesite as sources of magnesia products are dolomite, brucite, and sea-water. Dolomite, in addition to its newly discovered possibilities for the making of refractories, has long been the principal source of basic magnesium carbonate and pure magnesium oxide, and processes have been worked out for the production of magnesium metal from it. Brucite is being quarried in the United States for the manufacture of refractories. The extraction of magnesia from sea-water has now reached the commercial stage in California and in England, the material so obtained being now marketed in various forms for industrial and pharmaceutical purposes, and for use in refractory products.

"Prices of calcined magnesite f.o.b. Montreal or Toronto, as quoted by Canadian Chemistry and Process Industries for March, 1941, were \$70 to \$90 per ton. This price has obtained since November, 1939, when the price rose from the \$48 to \$60 range that had prevailed for more than a year previously."

Table 229.—Production of Magnesitic Dolomite (Calcined) in Canada, 1930-1940

Year	Tons	Value
		\$
1930	13,336	336,162
1931	11,411	295,579
1932	(a)	262,860
1933	(a)	360,128
1934	(a)	382,927
1935	(a)	486,084
1936	(a)	768,742
1937	(a)	677,207
1938	(a)	1,420,261
1939	(a)	474,418
1940	(a)	897,016

† Represents value of magnesite (dead-burned, etc.) only, whereas the values for years immediately preceding include the value of some end products containing imported material; for this reason the 1938, 1939 and 1940 values are not entirely comparable with those for preceding years.

(a) Not published.

Table 230.—Magnesite and Dolomite Used in the Canadian Primary Iron and Steel Industry, 1931-1940

	Dolomite		Magnesite	
	Short tons	Value	Short tons	Value
		\$		\$
1931	15,773	76,317	(a)	(a)
1932	6,725	32,523	420	14,500
1933	6,874	30,557	399	14,798
1934	14,748	69,104	2,733	105,072
1935	18,394	79,914	3,891	149,987
1936	43,562	145,502	6,432	230,656
1937	53,066	181,146	8,994	326,091
1938	40,540	137,127	9,219	336,811
1939	(b) 40,592	78,904	11,401	351,680
1940	(b) 59,284	123,429	13,673	506,032

(a) Information not available.

(b) In addition 14,858 tons of calcined were valued at \$99,838 in 1939 and 21,949 tons at \$136,360 in 1940.

Relatively large quantities of magnesite or magnesium refractories are also used in the smelting of non-ferrous ores but complete data relating to this consumption are not available.

Table 231.—Calcined Magnesite Used by the Artificial Abrasive and Abrasive Products Industry in Canada, 1933-1940

Year	Tons	Value	Year	Tons	Value
		\$			\$
1933	(a)	16,430	1937	484	29,242
1934	104	6,370	1938		
1935	40	2,448	1939	121	7,735
1936	418	25,256	1940	302	19,331

(a) Information not available.

In 1940 imports of calcined magnesite for making insulation materials totalled 1,267,200 pounds valued at \$39,829; magnesite, dead-burned, sintered, etc., 1,927,300 pounds worth \$62,925, and magnesite firebrick worth \$785,408. Exports of magnesite totalled 25,651,800 pounds valued at \$333,958.

MAGNESIUM SULPHATE (EPSOM SALTS—NATURAL)

No commercial production of mine or primary magnesium sulphate was reported in Canada in 1940. The output of this mineral in the Dominion in 1939 totalled 550 short tons valued at \$9,900 and came entirely from deposits located in British Columbia. The following information pertaining to magnesium sulphate is from a review prepared by the Bureau of Mines, Ottawa.

"Natural hydrous magnesium sulphate (Epsom Salts or Epsomite) occurs in deposits in lake bottoms or in solution in brine lakes in British Columbia. In Saskatchewan it is found associated with sodium sulphate. Attempts have been made to produce refined salts, and a number of years ago there was considerable production from several of the "lakes" in British Columbia, and experimental shipments were made from one of the lakes in Saskatchewan.

"The largest production has come from the deposits at Basque, British Columbia, the material from which is refined at Ashcroft, 15 miles south of the deposit. The refinery, now owned by Ashcroft Epsom Salts Company, has a capacity of 10 tons of salt a day. It was operated until the early summer of 1939, when it closed down pending improved marketing conditions. The material produced was of high grade, four samples, representative of the different crystal sizes prepared, all ran over 99.5 per cent $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$.

"There are a number of other occurrences in British Columbia, near Clinton, north of Kamloops, and in Kruger's Pass, south of Penticton.

"In Saskatchewan, two lakes south of Wiseton contain brines high in magnesium sulphate, and Muskiki Lake, just north of Dana, contains brine high in magnesium and sodium sulphate, which at certain times of the year, crystallizes into a bedded deposit with layers of both salts.

"The imports in 1940 were 2,211 tons valued at \$86,090, compared with 1,950 tons valued at \$56,648 in 1939.

"As magnesium sulphate is not at present being manufactured in Canada, imports are dutiable at the rate of $17\frac{1}{2}$ per cent, otherwise the duty would be 20 per cent. The tariff on the material entering the United States is $\frac{3}{4}$ of a cent per pound, or \$15.00 per ton.

"Prices for Epsom salts remained steady for the greater part of the year, but with the discontinuance of supplies from European countries, hitherto the main source of supply, prices increased rapidly. Quotations at the end of the year for the technical grade, as given by Canadian Chemistry and Process Industries for Toronto or Montreal delivery, ranged from \$65.00 to \$70.00 per short ton in bags, whereas the B.P. material in barrels is quoted at from $3\frac{1}{2}$ to $3\frac{3}{4}$ cents per pound."

Table 232.—Production of Natural Magnesium Sulphate in Canada*, 1935-1940

Year	Tons	Value
		\$
1935.....	340	7,965
1936.....	654	13,712
1937.....	727	14,456
1938.....	470	9,400
1939.....	550	9,900
1940.....		

(*) Produced entirely in British Columbia.

Table 233.—Magnesium Sulphate Used in Canadian Pharmaceutical Preparations and in Tanning, 1935-1940

Year	Pharmaceutical preparations		Tanning	
	Pounds	Value	Pounds	Value
		\$		\$
1935.....	826,082	22,647	759,744	12,254
1936.....	878,120	23,162	1,115,965	15,120
1937.....	919,825	23,881	992,203	16,165
1938.....	855,547	23,687	1,272,549	14,153
1939.....	830,927	24,091	1,139,670	17,808
1940.....	925,948	31,554	1,646,217	34,242

MINERAL WATERS

Shipments of natural mineral waters from Canadian springs totalled 140,663 imperial gallons valued at \$20,892 in 1940 compared with 123,769 imperial gallons worth \$19,105 in the preceding year. Production during both years originated in Ontario and Quebec. Some of the more prominent Canadian mineral waters possessing special therapeutic or hygienic properties include the following: in Quebec, the Abenakis springs on the St. François river in Yamaska county; Potton Springs in Brome county and the Coulombia spring at L'Epiphanie. In Ontario, saline, sulphur and gas springs occur at Caledonia Springs and at Carlsbad Springs, near Ottawa; the waters range from alkaline to strongly saline. St. Catharines, near Niagara, is one of the oldest Canadian mineral water resorts and sulphur waters are found at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta. In British Columbia the Harrison Hot Springs in the Fraser Valley and the Halcyon Hot Springs on Arrow Lake are noted for their curative properties.

The total number of firms reporting production of natural mineral waters in the Dominion was 15 in 1940, of which 11 were located in the province of Quebec and 4 in Ontario.

Table 234.—Shipments of Natural Mineral Waters from Canadian Springs, 1931-1940

	Quebec		Ontario		Canada	
	Imp. gal.	\$	Imp. gal.	\$	Imp. gal.	\$
1931.....	19,868	4,746	197,540	8,578	217,408	13,324
1932.....	15,506	4,697	61,208	2,473	76,714	7,170
1933.....	9,024	3,094	29,794	2,347	38,818	5,441
1934.....	75,665	16,116	21,775	1,622	97,440	17,738
1935.....	126,616	15,113	19,900	1,477	146,516	16,590
1936.....	131,186	17,399	23,100	1,117	154,286	18,516
1937.....	198,319	19,697	26,700	889	225,019	20,586
1938.....	159,893	19,033	28,416	2,586	188,309	21,619
1939.....	104,629	17,503	19,140	1,602	123,769	19,105
1940.....	109,025	18,466	31,638	2,426	140,663	20,892

Imports into Canada of natural mineral waters, not in bottles, totalled 60 imperial gallons valued at \$23 in 1939; there were no corresponding imports in 1940. Mineral and aerated waters, n.o.p., imported during 1940 were valued at \$37,013 against \$69,525 in the preceding year.

Exports of mineral and aerated waters during 1940 were valued at \$2,363 while in 1939 similar exports amounted to \$1,842.

Table 235.—Sales of Natural Mineral Waters (*) by the Canadian Aerated Waters Industry, 1931-1940

Years	\$	Years	\$
1931.....	140,730	1936.....	63,687
1932.....	92,066	1937.....	102,648
1933.....	77,125	1938.....	105,872
1934.....	52,113	1939.....	95,531
1935.....	45,100	1940.....	89,013

*Whether fortified or not.

PHOSPHATE

Production (mine sales) of phosphate in Canada in 1940 totalled 358 short tons valued at \$4,039 compared with 157 tons at \$1,712 in 1939. The following information relating to this mineral is from a review prepared by the Bureau of Mines, Ottawa:

"As in past years, phosphate production consisted of apatite obtained from the mica-apatite deposits of the Precambrian area north of Ottawa, in western Quebec, where a little was taken out by about a dozen small-scale producers in the Gatineau-Lièvre rivers—Templeton district. Most of the output was in less than individual car-load lots, and the bulk of it was sold to the Electric Reduction Company, Buckingham, Quebec, for the production of phosphorus or its products. This company has for years been practically the sole customer for domestic apatite;

purchases in 1940 are reported as 332 tons, at a base price of \$11 for 80 per cent grade, plus or minus 14 cents per unit above or below this figure. Early in 1941, Canadian Refractories Limited, Kilmar, Quebec, reported that they would be in the market for about 100 tons annually.

"The only other known occurrence of phosphate in Canada is a belt of rather low-grade sedimentary rock extending northward along the continental divide from the Crowsnest area, just west of the Alberta-British Columbia boundary; it has been traced as far north as Jasper, Alberta. Operations some ten years ago in the Crowsnest-Michel area by the Consolidated Mining and Smelting Company resulted in the shipment of 5,000 tons of this rock to Trail, British Columbia, for the manufacture of fertilizer, but attempts to concentrate it proved unsuccessful and the company discontinued mining and has since drawn its supplies from Garrison, Montana. Eastern Canadian plants using phosphate for fertilizer or other purposes employ mainly Florida rock; in 1940, this cost about \$15 per ton, delivered, for 75 per cent grade.

"Total world production of phosphate is of the order of about 11 million long tons annually. The great bulk consists of sedimentary rock, but the Russian output of apatite, produced as concentrate from nepheline-apatite rock, amounts to about one million tons. Outside of Russia, Sweden and Canada are the only other producers of apatite for which figures are available.

"Although fertilizers will always continue to consume the great bulk of the world's phosphate produced, a growing future for phosphorus and its compounds seems to be assured. One of such chemicals that is rapidly coming into extensive use is trisodium phosphate, employed as a detergent in laundry work and as a general cleanser, as well as for preventing scale or scum in boiler-feed and washing waters, and in the tanning, photographic, sugar and other industries. The removal of injurious fluorine, the cause of "mottled" teeth, from the potable waters is now accomplished by filtering through a bed of tricalcium phosphate. Sodium pyrophosphate and tetrphosphate are proving of value for deflocculating and lowering the viscosity of the muds used in oil-well drilling. Sodium metaphosphate is a strong "wetting" agent, and is highly efficient in the flotation of certain non-metallic minerals, and also in laundry practice. Alkaline-earth phosphate binders are proving of value for refractory materials. Research is proceeding on the use of phosphate in glass batches. Non-fertilizer uses for phosphate in the United States have been showing a steady expansion and now total about half a million tons annually."

Table 236.—Production of Phosphate in Canada, 1934-1940

Year	Short tons	\$
1934.....	81	683
1935.....	186	1,103
1936.....	525	4,927
1937.....	100	900
1938.....	208	1,886
1939.....	157	1,712
1940.....	358	4,039

The largest annual output of phosphate to be recorded in Canada was for 1890 in which year production was reported at 31,753 tons valued at \$361,045. The total production of the mineral in the Dominion from 1870 to the end of 1940 totalled 342,700 short tons valued at \$4,662,087.

Imports of phosphate rock into Canada in 1940 totalled 165,858 tons valued at \$663,554—all from the United States.

In 1940 imports into Canada of fertilizers, superphosphate or acid phosphate of lime totalled 1,993,728 cwt. valued at \$982,337, all of which came from the United States. Imports of phosphoric acid in 1940 totalled 368,625 pounds appraised at \$20,026.

Phosphate chemicals and ferro-phosphate are now manufactured in Canada at Buckingham, Quebec, from phosphate rock. The Consolidated Mining and Smelting Company of Canada Limited treat imported phosphate rock, (at Trail, B.C.) with sulphuric acid, producing "triple" superphosphate; the Company also makes ammonium phosphate and mixtures of ammonium phosphate and ammonium sulphate.

Table 237.—Phosphate Rock and Superphosphate Used in the Manufacture of Canadian Fertilizers, 1931-1940

Year	Superphosphate		Phosphate rock	
	Short tons	\$	Short tons	\$
1931.....	51,639	595,789	48,373	395,547
1932.....	36,005	366,462	41,114	316,518
1933.....	59,443	657,123	21,961	164,614
1934.....	73,182	839,980	48,007	396,133
1935.....	86,701	986,674	74,507	610,118
1936.....	97,515	1,103,222	60,924	438,948
1937.....	137,801	1,661,243	101,704	726,572
1938.....	180,243	2,193,699	102,125	765,816
1939.....	174,989	2,026,293	96,319	711,508
1940.....	175,045	2,175,615	143,667	1,262,847

"Metal and Mineral Markets"—New York—June, 1941—phosphate quotations were—per long ton, f.o.b. mines: Florida pebble, domestic: 77 to 76 per cent, \$3.65; 75 per cent, \$2.90; 72 per cent, \$2.40; 70 per cent, \$2.15.

POTASH

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland County, Nova Scotia, and at Gautreau, Westmorland County, New Brunswick. Potassium chloride occurs at Malagash in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. A 1940 annual report by the Bureau of Mines, Ottawa, refers to the Malagash occurrence as follows:

"In Nova Scotia, Malagash Salt Company produced slightly less in 1940 than in the previous year, owing to a fire which completely destroyed its power plant early in December, in consequence of which a complete shut down of underground development was necessary. Temporary power arrangements have been made until such time as a new and permanent plant can be erected. Definite zones in which indications of potash salts occur have been correlated from the second to the twenty-sixth level and there seems to be an increase in the potash content with depth. The study of these zones is being continued."

Complete statistics relating to world production of potash are not available for 1940 as publication of potash production statistics by European governments virtually ceased in the summer of 1939, and no adequate data are available since.

Table 238.—Potash Salts Used in the Manufacture of Canadian Mixed Fertilizers, 1939 and 1940

	1939		1940	
	Tons	Cost at works	Tons	Cost at works
Nitrate of potash.....	53	\$ 2,049	23	\$ 1,338
Kainite and potash manure salts.....	128	2,569	.....	1
Muriate of potash.....	40,320	1,158,559	43,902	1,348,413
Sulphate of potash.....	4,452	166,322	5,220	206,809

Table 239.—Sales of Potash Salts for Fertilizer Purpose, Other than for the Manufacture of Mixed Fertilizers, Years ended June 30, 1939 and 1940

	1939	1940
	(Short tons)	
Muriate of potash.....	8,643	7,808
Sulphate of potash.....	534	185

Imports into Canada in 1940 of muriate of Potash (fertilizer) totalled 108,333,200 pounds valued at \$1,385,278; those of sulphate of potash, crude (fertilizer) totalled 8,691,900 pounds worth \$147,926. Imports of Caustic Potash totalled, 1,547,608 pounds valued at \$90,772.

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PYRITES (Sulphur)

Canadian sulphur production is computed as the sulphur in iron pyrites shipped plus the sulphur recovered from non-ferrous smelter gases. Production in 1940 totalled 170,630 tons valued at \$1,298,018.

No iron pyrites deposits, known as such, have been mined in Canada for some years and statistics published regarding recent pyrites production refer to by-product iron pyrites recovered in the mining and concentrating of copper-gold-silver ores.

Sulphur employed in the manufacture of sulphuric acid during 1940 was recovered from salvaged smelter gas in Ontario and British Columbia. In Ontario, Canadian Industries Limited continued the operation of its acid plant at Copper Cliff, using sulphur dioxide obtained from the smelter of the International Nickel Company, while in British Columbia the Consolidated Mining and Smelting Company of Canada, Limited, manufactured sulphuric acid and other chemical products at Trail, using the by-product gases of its metallurgical plants. The Consolidated Mining and Smelting Company reported in 1939 that the percentage of sulphur dioxide removed from flue gases from metallurgical operations and utilized mainly in the production of sulphuric acid and fertilizers, increased to 70.3 per cent compared with 53.3 per cent in 1937.

The Bureau of Mines, Ottawa, reviews pyrites for 1940 as follows:

"Pyrites is produced in Canada as a by-product in the treatment of copper-pyrites ores at the Aldermac and Noranda mines in Quebec, and at the Britannia mine in British Columbia. No lump pyrites has been produced in Canada for several years.

"Aldermac Copper Corporation's mine and concentrator, twelve miles west of Noranda, Quebec, were in continuous operation in 1940. The copper concentrate is shipped for treatment to the Noranda smelter, while the high grade iron pyrites concentrate is shipped partly to chemical plants in the United States and partly to Three Rivers, Quebec, for use by St. Lawrence Paper Mills Company. The main shaft of the mine was extended 125 feet to a depth of 1,375 feet, and the tenth, or bottom level, was opened up. The east end of the property was explored on the surface by diamond drilling and geophysical work, and underground by crosscutting and diamond drilling.

"At the Noranda mine, a small tonnage of pyrites concentrate—a by-product of the milling process—was marketed for the manufacture of acid.

"At Three Rivers, all of the pyrites used in the Freeman flash-roasting plant in the mill of St. Lawrence Paper Mills Company is now being obtained from the Aldermac mine. Formerly the plant burned pyrites obtained from the old Eustis mine which was closed down in June, 1939. The Freeman plant supplies all of the sulphur dioxide and part of the steam required for the operation of the company's sulphite plant.

"In British Columbia, part of the large output of pyrites from the Britannia mine was consigned to the acid plant of Nichols Chemical Company at Barnet, British Columbia. As in previous years, however, much of the output was stored, awaiting more favourable market conditions. Some of this stock was exported in 1939.

"Northern Pyrites, Limited, last year completed a program of development work that has been in progress for the past four years on its Ecstall pyrites property, located on Ecstall river about sixty miles south of Prince Rupert. A large plant as well as a railway to tidewater is required before active production can commence, but in the meantime, the company is awaiting more favourable market conditions. The Granby Company did considerable exploratory diamond drilling on the Ecstall property several years ago. According to reports, the orebodies contain 5,000,000 tons of ore averaging 49 per cent sulphur, 42 per cent iron, 2.3 per cent zinc, less than one per cent copper, and about \$1.00 a ton in gold and silver.

"Although the Freeman process of flash roasting, designed for by-product flotation fines that are obtained from the treatment of copper ore, has opened a prospective market for this class of ore, it is not to be assumed that the mining of pyrites will be stimulated. Ample supplies of pyrites fines are already available at strategic points to meet any demand that may arise in the immediate future.

"There is apparently no standard price in Canada for sulphur in pyrites. Most contracts are believed to be based on a price of 5 cents or better per unit (22.4 pounds) of sulphur per long ton, f.o.b. cars at point of production."

"Metal and Mineral Markets"—New York—June, 1941, quotation for iron pyrites was per long ton unit of sulphur, c.i.f. United States ports, guaranteed 48 per cent sulphur, Spanish 12 cents nominal. Sulphur—per long ton for domestic market \$16 f.o.b. Texas Mines. "Canadian Chemistry and Process Industries" Toronto, quoted sulphur, June, 1941;—sulphur, crude, contracts, f.o.b. cars at United States mines, long ton \$16.00 (U.S.); crude, contracts, St. Lawrence and Maritime ports long ton \$21.50 to \$22.50 U.S. funds.

Table 240.—Production of Sulphur† in Canada, 1931-1940

Year	Tons	\$
1931.....	50,107	429,457
1932.....	53,172	470,014
1933.....	57,373	510,299
1934.....	51,537	515,502
1935.....	67,446	634,235
1936.....	122,132	1,033,055
1937.....	130,913	1,154,992
1938.....	112,395	1,044,817
1939.....	211,278	1,668,025
1940.....	170,630	1,298,018

† Sulphur in iron pyrites shipped plus sulphur recovered from non-ferrous smelter gases.

Table 241.—Production in Canada of Pyrites with Sulphur Content, Including Sulphur Contained in Sulphuric Acid, etc., Made from Smelter Gases, 1939 and 1940

—	Pyrites (*)			Smelter gas		Total sulphur	
	Sales	Sulphur content		Sulphur content		Tons	Value
	Tons	Tons	Value	Tons	Value		
			\$		\$		\$
1939							
Quebec.....	122,218	61,476	275,951			61,476	275,951
Ontario.....				16,126	161,260	16,126	161,260
British Columbia.....	105,418	52,973	423,784	(a) 80,703	807,030	133,676	1,230,814
Canada.....	227,636	114,449	699,735	96,829	968,290	211,278	1,668,025
1940							
Quebec.....	124,716	61,728	212,012			61,728	212,012
Ontario.....				18,688	186,880	18,688	186,880
British Columbia.....	3,049	1,507	12,056	48,538	485,380	90,214	899,126
Canada.....	127,765	63,235	224,068	(a) 67,226	672,260	170,630	1,298,018

(*) Recovered from copper ore deposits.

(a) Includes elemental sulphur and sulphur in sulphuric acid and direct ammonium sulphate.

The production of sulphuric acid in Canada totalled 312,699 tons (66° Bé) in 1940 compared with 249,558 tons in 1939 and 268,339 tons in 1938.

Imports of sulphuric acid amounted to 142 tons valued at \$17,661 during 1940 and exports totalled 2,244 tons at \$39,844.

Imports of brimstone and sulphur into Canada in 1940 totalled 4,311,946 cwt. valued at \$3,628,348.

Table 242.—Consumption of Sulphur by Specified Canadian Industries, 1939-1940

Industry	1939		1940	
	Tons	\$	Tons	\$
Wood-pulp.....	126,818	2,763,657	182,357	4,157,629
Petroleum refining.....	88	4,161	61	3,110
Acids, alkalies and salts.....	13,894	286,296	22,595	479,875
Matches.....	84	3,924	67	3,116
Explosives.....	1,862	39,285	1,819	36,755
Insecticides.....	1,284	54,735	1,168	41,080
Adhesives.....	66	1,904	70	2,429
Chemicals, miscellaneous.....	3	129	2	121
Rubber.....	1,269	58,977	1,492	75,219
Sugar.....	152	7,379	167	8,494
Fruit and vegetable preparations.....	36	3,131	58	3,668
Other industries (*).....	227	8,687	269	10,107

(*) Starch and glucose, dyeing and finishing of textiles.

SILICA BRICK

The production of silica brick in Canada during 1940 totalled 3,438 M valued at \$182,786 compared with 2,493 M worth \$124,807 in 1939. The manufacture of these refractories was confined, in both years, to the plants of the Dominion Steel and Coal Company, Ltd., at Sydney, Nova Scotia, and the Algoma Steel Corporation Ltd., Sault Ste. Marie, Ontario. The brick manufactured by both of these companies are processed from crushed silica rock and are utilized in furnace construction and repairs.

Table 243.—Production of Silica Brick in Canada, 1928-1940

Year	M	\$	Year	M	\$
1928.....	3,224	155,502	1935.....	2,461	96,194
1929.....	†3,951	173,581	1936.....	2,393	97,285
1930.....	2,418	97,379	1937.....	3,744	181,126
1931.....	900	35,746	1938.....	1,788	100,403
1932.....	93	4,304	1939.....	2,493	124,807
1933.....	636	23,185	1940.....	3,438 (a)	182,786
1934.....	2,528	85,945			

†) Largest annual output.

(a) Largest annual value.

Imports of silica brick into Canada in 1940 were valued at \$472,215; imports of silica sand for the manufacture of glass, etc., totalled 5,574,549 cwt. valued at \$556,683. Imports of silex or crystallized quartz totalled 82,986 cwt. worth \$56,814.

SODIUM CARBONATE (NATURAL)

Production of natural sodium carbonate in Canada during 1940 totalled 220 short tons valued at \$1,760 compared with 300 tons at \$2,400 in 1939. Deposits of this material in the form of "natron" (sodium carbonate with 10 molecules of water) and also as brine, occur in a number of "lakes" throughout the central part of the province of British Columbia, chiefly in the Clinton mining division, around 70 Mile House, and in the neighbourhood of Kamloops. Production in Canada during recent years has come entirely from deposits in British Columbia and in 1940 all commercial shipments of primary or mine material were made from 70 Mile and Chasm on the line of the Pacific Great Eastern Railway. The first commercial shipments of natural sodium carbonate from Canadian deposits were recorded for 1921 in which year 197 short tons valued at \$14,775 were reported as sold. The total Canadian production of the material to the end of 1940 amounted to 8,679 short tons valued at \$101,630.

Table 244.—Production of Sodium Carbonate (Natural) in Canada, 1929-1940

Year	Tons	\$	Year	Tons	\$
1929.....	600	8,100	1935.....	242	2,430
1930.....	384	4,550	1936.....	192	1,677
1931.....	712	7,351	1937.....	286	2,574
1932.....	495	5,450	1938.....	252	2,268
1933.....	559	5,773	1939.....	300	2,400
1934.....	244	1,920	1940.....	220	1,760

"Canadian Chemistry and Metallurgy"—Toronto—quoted soda ash (June, 1941)—bags of 100 pounds, \$2.00.

Table 245.—Consumption of Soda Ash (Sodium Carbonate) in Specified Canadian Industries

Industry	Unit	1939		1940	
			\$		\$
Chemicals and allied products (a).....	pounds	31,320,339	437,443	38,721,428	553,507
Manufactures of non-metallic minerals (b).....	pounds	55,444,267	697,277	59,118,000	746,685
Pulp and paper.....	tons	2,538	83,548	2,817	93,294
Textiles (dyeing and finishing).....	pounds	346,476	6,686	524,359	9,951
Sugar refineries.....	pounds	128,987	2,619	234,087	5,206
Dyeing, cleaning and laundry work.....	pounds	789,244	21,119	840,671	24,438

(a) Includes acids, salts, explosives, soap, etc.

(b) Includes coke and gas, glass and petroleum refining.

Imports of soda ash or barilla into Canada in 1940 totalled 9,293,344 pounds valued at \$110,285.

SODIUM SULPHATE

(Glauber's Salt and Salt Cake)

Producers' shipments of natural sodium sulphate in Canada totalled 94,260 short tons valued at \$829,589 in 1940 compared with 71,485 tons at \$628,151 in 1939.

Sodium sulphate is recovered in Canada almost entirely in the province of Saskatchewan and is produced either as a hydrated sodium sulphate, known as Glauber's salt, or anhydrous sodium sulphate, known to the trade as "salt cake". It occurs as crystals (Glauber's salt) or in the form of partially saturated or saturated brines in many lakes throughout Western Canada. Some of the Saskatchewan properties are equipped with plants for the purification and dehydration of the crude salt. It is interesting to note that a relatively small commercial output of the mineral has been reported in the province of Alberta since 1937. The increased demand for sodium sulphate from the pulp mills and the nickel-copper smelting industry was largely responsible for the large increase in output of sodium sulphate in recent years.

The total commercial shipments of Canadian natural sodium sulphate since the commencement of production in 1920 to the close of 1940 totalled 676,046 short tons valued at \$3,829,286.

During 1940 six firms, five in Saskatchewan and one in Alberta, reported production of natural sodium sulphate; capital employed by the industry was reported at \$961,602; fuel, purchased electricity and process supplies consumed totalled \$216,779 and \$157,538 were distributed as salaries and wages to 109 employees.

"Canadian Chemistry and Metallurgy"—Toronto—(June, 1941)—quoted sodium sulphate (Glauber's salt), crystals, in bags, cwt., to \$1.25; carlots, bulk—\$18.00 per ton; anhydrous, bags \$52.00 to \$60.00 per ton. Salt cake f.o.b. western points, \$8.00-\$8.50 per ton.

Table 246.—Production of Natural Sodium Sulphate (*) in Canada, 1929-1940

Year	Short tons	\$	Year	Short tons	\$
1929.....	5,018	64,112	1935.....	44,817	343,764
1930.....	31,571	293,847	1936.....	75,598	552,681
1931.....	44,957	421,097	1937.....	79,804	617,548
1932.....	22,466	271,736	1938.....	63,009	553,307
1933.....	50,080	485,416	1939.....	71,485	628,151
1934.....	66,821	587,986	1940.....	94,260	829,589

(*) Produced in the province of Saskatchewan, with the exception of 80 tons valued at \$480 produced in Alberta during 1937, 89 tons worth \$1,127 produced in the same province in 1938, 30 tons at \$186 in 1939 and 10 tons at \$50 in 1940.

Imports of salt cake (sulphate of soda) into Canada in 1940 totalled 16,590,812 pounds valued at \$94,674; imports of Glauber's salt in 1940 totalled 1,086,057 pounds worth \$12,450.

Table 247.—Salt Cake Used in the Manufacture of Canadian Wood-pulp and in the Acids, Alkalies and Salts Industry, 1932-1940

Year	Medicinal and pharmaceutical industry		Acids, alkalies† and salts industry		Wood-pulp	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1932.....			94	1,811	24,301	489,343
1933.....	39	4,879	9,968	146,201	29,563	580,251
1934.....	51	7,278	26,075	368,576	34,559	655,905
1935.....	59	4,617	22,485	316,734	35,350	642,801
1936.....	27	2,546	7,220	102,176	41,524	711,635
1937.....	29	2,234	8,006	113,054	50,584	884,437
1938.....	21	1,593	3,412	48,486	33,213	588,217
1939.....	24	1,940	11	314	40,685	722,178
1940.....	21	1,820	14	416	53,540	994,475

† The 1932, 1936, 1937, 1938, 1939 and 1940 figures do not include sodium sulphate consumed direct in the smelting of nickel copper ores.

In 1939 there were 801,220 pounds of Glauber's salt valued at \$11,636 used in Canada in the dyeing and finishing of textiles as compared with 645,306 pounds at \$8,419 in 1938.

"At Sybouts Lake, 9 miles south of Gladmar, Saskatchewan, a start was made in 1940 on the erection of a dehydrating plant by a company known as Sybouts Sodium Sulphate Company, Limited with head office at Gladmar, Saskatchewan. This plant is expected to be in operation during the summer of 1941. In anticipation of the completion of the plant some 10,000 tons of crystals were harvested and stockpiled on the shore adjacent to the new plant site.

"No production is reported from British Columbia in 1940. Sodium sulphate is the predominant salt in a number of deposits and, during the past year, several of these deposits were prospected to prove their extent.

"A discovery made in New Brunswick during 1937, may yet prove to be of importance as a source of sodium sulphate. New Brunswick Gas and Oilfields, Limited, in drilling for gas at Weldon, has proved large thicknesses of rock salt (sodium chloride.) Two holes drilled 3,500 feet apart, from which cores have been obtained, have shown the presence of a bed of glauberite ($\text{Na}_2\text{SO}_4 \cdot \text{CaSO}_4$) from 60 to 100 feet thick, mostly overlying the rock salt, the sodium sulphate content of which ranges from 25 to 30 per cent. Both glauberite and sodium chloride were proved by drilling in 1939, thus further extending the salts basin. Many millions of tons of sodium sulphate would seem to be indicated in this deposit. The Bureau of Mines, Ottawa, has done much research work on the material recovered in these cores, and has been able to indicate probable method of recovery of the sodium sulphate, but further detailed work must be done to determine the full commercial possibilities of the deposit.

"The industry in Western Canada seems now to be well established, and steady progress is being made. The investigation of sodium sulphate deposits in this section of the Dominion was started by the Bureau of Mines in 1921, and over 120,000,000 tons of hydrous salts was proved in the few deposits examined in detail. In 1921 none of this material was used commercially, but by 1939 the revenue derived by Canadian railways from this industry in incoming and outgoing freight exceeded \$1,500,000." (Bureau of Mines, Ottawa).

STRONTIUM MINERALS

The Bureau of Mines, Ottawa, in a 1940 review of strontium minerals states:

"Several occurrences of celestite of possible economic interest are known in Canada, but there has been very little attempt at development; the last was in 1920-21, when some ground material was produced from a deposit in Bagot township, Ontario, and sold to the paint trade. The Bagot ore has coarsely-fibrous character and is not very pure, containing about 18 per cent of barium sulphate. On this account, it would not be favoured for chemical use, but is regarded as suitable for paints and general filler or loader use. Renewed interest in the deposit developed in 1940 and plans were reported for placing the property in production, but these have not yet materialized. Celestite similar in character and analysis occurs at some of the old fluorspar mines of the Madoc area, in Ontario, and some might be recoverable from the waste dumps.

"A very pure celestite, analysing 98-99 per cent strontium sulphate, occurs as a small vein of coarse platy crystals in Lansdowne township, Ontario. Some was mined many years ago, but its disposition is not on record. Calcite appears to be the only associated mineral, and recovery of a concentrate of high purity should be easily made by jigging and tabling. In the event of a war shortage of imported strontium compounds, this deposit probably offers the best possibility for supplying the deficiency, though the indicated tonnage is not great.

"Celestite of similar type to the above occurs also in Fitzroy township, Ontario, where it was disclosed in a small prospect shaft made for galena about 30 years ago. Analysis of selected material showed 93 per cent strontium sulphate. A moderate supply might be obtainable from this source, but the ore would probably need to be concentrated.

"No important deposits of strontianite are known in Canada, though several occurrences of the mineral are on record: these are probably only of mineralogical interest.

"Celestite (strontium sulphate) is the principal commercial source of strontium for the manufacture of the various strontium salts used in industry. Strontianite (the carbonate) is a less common mineral, used for the same purpose. Most of the world's supply of celestite is obtained from England, and some strontianite is mined in Germany. Important deposits are reported to occur in India and Newfoundland, but there has been no production from these sources as yet. There are no very complete figures on the world trade in these minerals, but in recent years total annual production would appear to have been around 5,000-7,000 tons.

"As stated above, the chief use for both celestite and strontianite is for the manufacture of various strontium salts and chemicals used in industry and medicine. Of such compounds, the nitrate, carbonate, and hydrate are the most important. Strontium nitrate is employed mainly in pyrotechnics, for fireworks, signal flares, tracer bullets, etc., to which it imparts the characteristic strong red flame colour of the element. The hydrate is chiefly used in the refining of beet sugar by the Scheibler process, but this is little practised on this continent, where the Steffens, or lime, process is mainly used. The carbonate is said to be used to some extent as a batch ingredient in the manufacture of certain types of glass, and as a fluxing and desulphurizing and dephosphorizing agent in iron and steel.

"Strontium metal, made from either the natural sulphate or carbonate, finds limited application in certain alloys, mainly of copper, tin, lead, zinc, and cadmium.

"According to American trade journals, ground celestite of 92 per cent grade currently sells at \$45 per ton.

"A review of the strontium situation in the United States, published early in 1941, furnished the following information: A new, and possibly the principal, outlet for strontium ores is now offered by the employment of powdered celestite for purifying caustic soda solutions used in the manufacture of rayon. Domestic reserves of celestite are held to be abundant, though American requirements have been supplied almost entirely by imported material for many years. In 1940, several deposits were reported to be under development in California, and celestite-bearing limestones in Ohio are regarded as of possible commercial interest. An occurrence of strontianite has been reported in New Mexico, and impure celestite has been mined in Texas to replace barite in oil-well drilling muds. American importers of celestite are stated to have stocked up heavily

in 1939 at a delivered price of about \$14 per ton for crude ore, and though quotations on certain strontium salts have shown a slight rise, no shortage is feared."

Data relating to Canadian imports of strontium minerals or chemicals are not published separately in Canadian trade reports.

Table 248.—Production of Miscellaneous non-Metallic Minerals in Canada, 1939 and 1940

Item	Unit of measure	1939		1940	
		Quantity	Value	Quantity	Value
			\$		\$
Barytes.....	Ton	(c)	3,639	338	4,819
Diatomite.....	Ton	301	10,388	248	7,957
Fluorspar.....	Ton	240	4,995	4,454	59,317
Graphite.....	\$		61,684		94,038
Grindstones (b).....	Ton	304	15,278	341	14,543
Lithium minerals.....	\$				
Magnesium sulphate.....	Ton	550	9,900		
Magnesitic dolomite.....	\$		474,418		897,016
Mineral waters.....	Imp. gal.	123,769	19,105	140,663	20,892
Peat production.....	Ton	445	2,445	(d)	
Phosphate (a).....	Ton	157	1,712	358	4,039
Silica brick.....	M	2,493	124,807	3,438	182,736
Sodium carbonate.....	Ton	300	2,400	220	1,760
Sodium sulphate.....	Ton	71,485	628,151	94,260	829,589
Total (Gross)	\$		1,358,922		2,116,756
Sulphur production (*).....	Ton	211,278	1,668,025	170,630	1,298,018

(a) Represents apatite mined in Quebec, usually a by-product in mica production.

(b) Includes pulpstones, etc.

(c) Not available for publication.

(d) Some 30 tons of peat valued at \$75 was consumed by the producer so is not counted under sales.

(*) Includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making or recovered as elemental sulphur, or in ammonium sulphate (direct). General statistics relating to production of sulphur included with those of the copper-gold mining and non-ferrous smelting industries.

Table 249.—Principal Statistics Relating to Miscellaneous non-Metal Mining Industries in Canada, 1939 and 1940

	1939	1940
Number of plants.....	47	46
Capital employed.....	\$ 3,128,035	2,491,527
Number of employees—On salary.....	68	67
On wages.....	397	480
Total	465	547
Salaries and wages—Salaries.....	\$ 140,202	169,102
Wages.....	\$ 398,941	534,399
Total	\$ 539,143	703,501
Selling value of products (gross).....	\$ 1,358,922	2,116,756
Cost of fuel and electricity.....	\$ 260,652	402,969
Cost of process supplies used.....	\$ 133,705	205,059
Selling value of products (net).....	\$ 964,565	1,467,363

Table 250.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1940

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	382,326
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,256,061
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	159,514
Inventory value of finished products on hand.....	108,455
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	585,171
Total	2,491,527

Table 251.—Wage-Earners, by Months, in the Miscellaneous Non-Metal Mining Industries in Canada, 1939 and 1940

Month	1939	1940		
		Surface	Under-ground	Mill
January.....	216	123	47	182
February.....	238	123	52	177
March.....	248	113	66	213
April.....	270	103	65	191
May.....	425	216	67	199
June.....	485	242	55	175
July.....	451	249	73	226
August.....	474	235	53	229
September.....	453	262	72	270
October.....	488	288	67	259
November.....	481	251	70	260
December.....	473	193	26	232
Average.....	397	202	60	218

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, and Stone, including Slate.

Grouped in this chapter are those industries producing structural materials of non-metallic composition. During the depression years, immediately following 1929, these important branches of the Canadian mineral industry suffered severe economic losses. Production declined and employment fell to a relatively low level. Shipments of cement, lime, stone, clay products, sand and gravel totalled \$58,534,834 in 1929; this high record value was succeeded by unbroken annual decreases to \$16,696,637 in 1933, from which year recovery has been relatively slow, however, a distinct advance was realized in 1937 when the value of these materials aggregated \$34,869,699 or an increase of 35.31 per cent over the corresponding value of \$25,770,741 in the preceding year. In 1938 there was a slight increase over 1937 in the value of clay products, also the output of sand and gravel was considerably greater, however, the total value of all structural materials produced in 1938 at \$33,878,666 represents a decrease of \$991,033 from the corresponding value of the preceding year. The recent increase in construction of defence works, such as, airports, military camps, barracks, etc., was reflected in the increase in output of certain structural materials, especially after the outbreak of war in September, 1939. During 1939 the annual value of structural materials increased to \$35,382,759 and in 1940 attained a total of \$43,703,949, the highest to be realized since 1930, when the value of these products aggregated \$53,727,465.

There has been an increasing consumption of stone and lime for other than building purposes. This has been particularly evident in recent years and is the result of expansion in certain industries where these materials are utilized in various chemical processes. Shipments of stone and lime for these purposes are classified, for convenience, with data relating to production of these same materials for structural purposes. However, statistics pertaining to their consumption for industrial purposes are segregated in the following tables.

Table 252.—Value of Construction Contracts Awarded, by Provinces, 1935-1940

(Maclean Building Reports Ltd.)

Provinces	1935	1936	1937	1938	1939	1940
	\$	\$	\$	\$	\$	\$
Maritimes.....	14,373,500	17,908,800	21,557,200	19,522,800	16,146,300	21,142,100
Quebec.....	44,471,900	45,749,500	71,940,800	65,778,900	62,846,600	96,326,300
Ontario.....	70,872,800	72,393,300	97,777,400	73,070,100	82,605,500	146,806,100
Manitoba.....	8,744,400	6,994,400	7,945,100	6,115,200	5,374,400	28,003,700
Saskatchewan.....	3,841,300	2,200,600	6,704,900	3,969,000	3,246,100	12,566,700
Alberta.....	5,893,000	6,297,400	4,901,000	8,180,000	5,234,900	23,940,100
British Columbia.....	12,108,100	11,044,000	13,230,300	10,641,900	11,724,700	17,224,800
Canada.....	160,305,000	162,588,000	224,056,700	187,277,900	187,178,500	346,009,800

Table 253.—Total Value of Work Performed in Canada by General and Trade Contractors (including Subcontractors), Municipalities, Harbour Commissions, Provincial and Dominion Government Departments in 1937, 1938, 1939 and 1940

(Construction Branch, Dominion Bureau of Statistics)

	\$
1937.....	351,874,114
1938.....	353,223,285
1939.....	373,203,680
1940.....	474,122,778

Table 254.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1936-1940

Province	1936	1937	1938	1939	1940†
	\$	\$	\$	\$	\$
Prince Edward Island.....	*27,663				
Nova Scotia.....	1,763,516	2,293,325	1,611,111	1,829,207	1,855,771
New Brunswick.....	931,827	1,128,931	2,188,889	1,911,041	936,161
Quebec.....	7,503,022	10,350,583	11,619,514	12,319,773	15,001,749
Ontario.....	10,326,967	15,121,178	11,997,177	12,856,694	16,636,844
Manitoba.....	1,666,789	1,673,124	1,805,875	1,646,797	2,600,304
Saskatchewan.....	380,115	585,673	781,224	556,973	906,181
Alberta.....	1,245,549	1,303,533	1,627,462	1,947,453	2,971,550
British Columbia.....	1,925,293	2,413,352	2,247,414	2,314,821	2,795,359
Canada—Gross value.....	25,770,741	34,869,699	33,878,666	35,382,759	43,703,949
Net value.....	21,052,574	28,868,189	28,446,299	29,628,817	34,893,571

* Sand and gravel. † Includes value of cement containers for first time.

NOTE: For statistics relating to employment etc., in these combined industries see totals in Table 20, chapter 1.

CEMENT INDUSTRY

Producers' sales of cement, as reported by the Canadian Cement Industry, totalled 7,559,648 barrels valued at \$11,775,345 in 1940, compared with 5,731,264 barrels at \$8,511,211 in 1939. Of the 1940 sales, 3,854,339 barrels were produced in Quebec plants, 2,355,352 barrels in Ontario, 572,408 barrels in Manitoba, 414,183 barrels in Alberta and 363,366 barrels in British Columbia. The high and low prices per barrel in 1940 were \$2.35 and \$1.32.

The number of firms reporting commercial production of cement in Canada during 1940 was 3 and the plants in operation numbered 8. Capital employed totalled \$50,370,276 and the industry distributed \$1,515,766 in salaries and wages to 1,052 employees. The total value of fuel and electricity used during the year under review amounted to \$2,347,730, of which \$1,621,511 were expended for coal and \$690,266 for electricity. Process supplies consumed, including chemicals, explosives, etc., were valued at \$712,193 and the following tonnages of primary materials of mineral origin were used in the manufacture of the final products: limestone, 1,765,944; clay, 144,152; gypsum, 38,903; shale, 18,347; sand, 15,298 and iron pyrites, 170. Imports of Portland cement into the Dominion in 1940 totalled 13,213 barrels worth \$69,821 compared with 16,620 barrels valued at \$58,316 in 1939. Exports in 1940 totalled 299,975 barrels appraised at \$414,442 as against 156,316 barrels worth \$159,579 in the preceding year.

In 1940, as in 1939, the wet process was employed in all Canadian cement plants with the exception of one in Alberta where the dry method was continued.

Under the title "Cement as a War Time Industry" *The Mining Journal*, London, says, in part:—"In view of the rigid economy now desirable in the use of timber and steel in the mining industry, the varied uses of cement may be considered. Underground, considerable attention is now being devoted to re-enforced concrete pit props. Prior to the war very large quantities of pit props were imported, as there was no shortage of material and wood was cheap. Under present conditions supplies have been curtailed for obvious reasons, and timber is now far more expensive . . . experiments with re-enforced concrete props gave details of practical results

at the coal face . . . the experiments demonstrated that re-enforced concrete props set with release devices can be used over and over again on working faces under normal roof conditions, that is, where the height reduction between the coal face and the edge of the waste, where the prop is withdrawn, is within the limits of the released device. The height reduction in the region where the concrete props were set was less than that in the adjacent areas where steel props were used, because the steel props, having a much smaller bearing area than the release devices, penetrated the floor. . . . The sanitary system of a well known town in India is largely constructed of Hume pipes and cement tanks. The Hume pipes were made locally in a wide variety of sizes and employed for a number of purposes. Sections of the large diameter pipes with cement bottoms were very popular as storage tanks for domestic water supplies. . . . one of the recent uses of cement is for the manufacture of re-enforced concrete sleepers. These sleepers can be advantageously employed in and around works and for sidings."

The new 12,000-barrel per day plant of the Permanente Corporation, Los Altos, California, has set what is probably an all-time low in raw-grinding cost. Grinding is done in two stages, the first consisting of ball mills in closed circuit with Dorr classifiers, giving a minus of 48 mesh product, and the second stage consisting of ball mills in closed circuit with Dorr bowl classifiers, giving a product 96 per cent of which is minus 200 mesh. The power consumption is said to be 10 to 11 kilowatt-hours per barrel of cement. (U.S. Bureau of Mines.)

"Portland cement is the product that is obtained by pulverizing to a fine consistency a clinker produced by calcining to incipient fusion an intimate mixture of properly proportioned argillaceous and calcareous substances, with only such additions subsequent to calcining as may be necessary to control setting and certain other properties. Such additions, which usually comprise about 3 to 3½ per cent by weight of the calcined product, consist principally of gypsum or mixtures of gypsum and anhydrite. The principal combinations of raw materials are (1) limestone with clay or shale, (2) cement rock (argillaceous limestone either alone or with high calcium limestone), (3) blast-furnace slag and limestone, (4) marl and clay, and (5) oyster shells and clay.

"Some years ago all Portland cement had fairly constant and uniform properties; in other words, there was only one standard Portland cement. In recent years the varied demands of construction have led to the development of a variety of Portland cements each adapted to a particular use. These include high-early-strength, masonry, low heat, and oil well cements." (U.S. Bureau of Mines)

Table 255.—Summary Statistics of Cement Production, Sales, Etc., in Canada, 1939 and 1940

	1939		1940	
	Barrels (*)	Value	Barrels (*)	Value
		\$		\$
Output	5,721,447		6,947,577	
Sold or used	5,731,264	8,511,211	7,559,648	11,775,345
Stocks on hand December 31st	1,865,471		1,253,400	
IMPORTS—				
Portland cement and hydraulic or water lime	16,620	58,316	13,213	69,821
Manufactures		14,968		16,461
Total Imports		73,284		86,282
EXPORTS—				
Portland cement	156,556	159,579	299,975	414,442
Apparent consumption	5,591,328		7,272,886	

(*) 1 barrel—350 pounds.

Table 256.—Production and Apparent Consumption of Cement in Canada, 1929-1940

Year	Sold or used		Apparent consumption
	Barrels	\$	Barrels
1929.....	12,284,081	19,337,235	12,105,950
1930.....	11,032,538	17,713,067	10,977,238
1931.....	10,161,658	15,826,243	10,085,988
1932.....	4,498,721	6,930,721	4,466,738
1933.....	3,007,432	4,536,935	2,974,020
1934.....	3,783,226	5,667,946	3,727,521
1935.....	3,648,086	5,580,043	3,610,217
1936.....	4,508,718	6,908,192	4,479,656
1937.....	6,168,971	9,095,867	6,167,485
1938.....	5,519,102	8,241,350	5,478,180
1939.....	5,731,264	8,511,211	5,591,328
1940.....	7,559,648	11,775,345	7,272,886

Table 257.—Producers' Sales of Cement in Canada, by Provinces, 1938-1940

Province	1938		1939		1940	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	2,730,320	3,693,188	3,027,759	4,035,294	3,854,339	5,432,105
Ontario.....	1,818,032	2,555,214	1,709,263	2,437,777	2,355,352	3,518,247
Manitoba.....	330,889	754,427	343,717	773,363	572,408	1,287,918
Alberta.....	304,373	611,790	377,846	744,357	414,183	832,508
British Columbia.....	325,488	626,731	272,679	520,420	363,366	704,567
Canada.....	5,519,102	8,241,350	5,731,264	8,511,211	7,559,648	11,775,345

Table 258.—Kilns Used by Canadian Cement Industry, 1932-1940

Year	Total daily capacity	
	Number	Barrels
1932.....	47	43,822
1933.....	41	43,622
1934.....	41	43,922
1935.....	20	32,650
1936.....	19	33,000
1937.....	18	33,900
1938.....	(a) 21	35,200
1939.....	(b) 21	35,000
1940.....	(c) 21	35,000

(a) 10 in use with a daily capacity of 23,100 barrels.

(b) 11 in use, capacity 23,700 barrels per day.

(c) 13 in use, capacity 27,950 barrels per day.

Table 259.—Specified Materials Used in Canadian Cement Plants, 1931-1940

Year	Shale	Limestone	Gypsum	Sand†	Clay	Pyrites
	Tons	Tons	Tons	Tons	Tons	Tons
1931.....	(a)	2,489,147	56,677	(a)	(a)	(a)
1932.....	(a)	1,141,376	27,538	(a)	(a)	(a)
1933.....	(a)	616,364	13,319	(a)	(a)	(a)
1934.....	(a)	806,546	19,172	(a)	(a)	(a)
1935.....	(a)	818,443	21,611	5,047	(a)	(a)
1936.....	(a)	1,180,358	25,447	8,549	94,943	(a)
1937.....	(a)	1,465,168	33,691	9,281	195,877	444
1938.....	13,821	1,344,868	51,975	9,465	143,421	22
1939.....	27,241	1,379,858	31,492	7,942	105,982	16
1940.....	18,347	1,765,944	38,903	15,298	144,152	170

(a) Data not recorded.

† Ground Quartzite or Sandstone.

Table 260.—Principal Statistics of the Cement Manufacturing Industry in Canada, 1939 and 1940

	1939	1940
Number of firms.....	3	3
Number of plants.....	8	8
Capital employed.....	\$ 51,251,358	50,370,276
Number of employees—On salary.....	91	83
On wages.....	910	969
Total.....	1,001	1,052
Salaries and wages—Salaries.....	\$ 198,141	191,548
Wages.....	\$ 1,099,401	1,324,218
Total.....	\$ 1,297,542	1,515,766
Selling value of products (gross).....	\$ 8,511,211	†13,006,643
Cost of fuel and electricity.....	\$ 1,705,981	2,347,730
Cost of process supplies (*).....	\$ 532,058	712,193
Value of containers.....	\$	1,231,298
Net value of products sold.....	\$ 6,273,172	8,715,422

(*) Other than fuel and electricity.

† Includes value of containers for the first time.

Table 261.—Capital Employed in the Cement Industry in Canada, 1940

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land.....	10,620,056
Present value of buildings, fixtures, machinery, tools and other equipment.....	33,453,392
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	745,520
Inventory value of finished products on hand.....	991,819
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	4,559,489
Total.....	50,370,276

Table 262.—Wage-Earners on 15th of Each Month, or Nearest Representative Date, 1939 and 1940

Month	1939	1940	
		Quarry	Mill
January.....	774	67	669
February.....	799	67	644
March.....	820	108	687
April.....	916	130	844
May.....	1,043	135	886
June.....	1,062	134	907
July.....	1,037	138	908
August.....	1,066	133	919
September.....	1,032	134	977
October.....	957	137	1,009
November.....	763	134	966
December.....	650	117	806

THE CEMENT PRODUCTS INDUSTRY

Production of manufactured cement products in Canada during 1940 was valued at \$5,303,560 compared with \$3,716,692 during 1939.

A total of 128 plants operated in this industry during 1940—there being 73 in Ontario, 32 in Quebec, 9 in British Columbia, 6 in Alberta, 1 in Nova Scotia, 4 in New Brunswick, 1 in Manitoba and 2 in Saskatchewan. The Ontario plants accounted for 52 per cent of the total production; establishments in Quebec contributed 38 per cent, and works in British Columbia accounted for 5 per cent, the remaining 5 per cent being distributed among New Brunswick, Nova Scotia, Manitoba, Saskatchewan and Alberta.

Products included ready-mixed concrete worth \$1,757,675, cement pipe of all kinds at \$791,371, hollow building blocks of cement at \$934,702, cinder blocks at \$275,169, artificial stone at \$155,500, cement bricks at \$52,616, and other items such as haydite blocks and slabs, laundry tubs, burial vaults, etc.

Data presented for this industry cover manufacturing only and do not include figures for the cement work done on the building of bridges, dams, foundations, etc.; this type of work has been covered in the annual survey of construction.

Table 263.—Products Made in the Cement Products Industry, by Provinces, 1940

Products	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Cement bricks.....	29,442	23,174			52,616
Cement hollow building blocks, etc.....	268,097	656,508	5,520	4,577	934,702
Cement drain pipe, sewer pipe, water pipe and culvert tile.....	334,119	378,845	39,022	39,385	791,371
Artificial stone.....	38,309	92,663	2,628	21,900	155,500
Cement laundry tubs.....		48,842	17,525	1,900	68,267
Cinder blocks.....	11,882	263,287			275,169
Cement stucco.....			8,026		8,026
Ready mixed concrete.....	881,593	558,535	148,928	168,619	1,757,675
All other products.....	441,108	744,814	47,516	16,995	1,250,433
Amount received for repair work.....		3,441		6,360	9,801
Total.....	2,004,550	2,770,109	269,165	259,736	5,303,560

Table 264.—Materials Used in the Cement Products Industry, by Provinces, 1940

Material	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Portland cement.....	440,859	634,232	96,041	76,115	1,247,247
Quicklime.....	1,288	1,096	919	5	3,398
Sand.....	129,403	138,334	19,829	17,342	304,998
Gravel.....	639	95,700	18,855	32,512	147,706
Crushed stone.....	160,995	49,912	1,533	289	212,729
Cinders.....	9,507	31,454		30	40,991
Reinforcing steel.....	75,094	70,132	3,030	2,930	151,186
Other materials.....	52,639	208,129	11,494	2,110	274,372
Boxes, crates, lumber, etc.....	883	18,088	5,236	898	25,105
Total.....	871,307	1,247,077	156,937	132,231	2,407,552

THE CLAY AND CLAY PRODUCTS INDUSTRY

The industrial clays of Canada may be classified as common clays, stoneware clays, fireclays, and china clays. Statistically, the ceramic industry of Canada is conveniently classified into two divisions: (1) Production from domestic clays, which includes the production of building brick, structural tile, drain tile, roofing tile, stoneware, sewer pipe, pottery and refractories, and (2) production from imported clays, which includes the manufacture of electrical porcelain, sanitary ware, sewer pipe, table ware, pottery, ceramic floor and wall tile, and various kinds of fireclay refractories.

A total of 164 plants representing a total capital investment of \$22,505,633 operated in the domestic and imported clay products industries in Canada during 1940. These two industries provided employment for 3,938 persons during the year; their earnings totalled \$4,248,861. The combined production in 1940 was valued at \$10,848,338 compared with \$8,123,215 in 1939.

1. Production from Domestic Clays, 1940

The gross value of Canadian producers' sales of domestic clays and products made from same totalled \$6,344,547 in 1940 compared with \$5,151,236 in 1939 and \$13,904,643, the all-time high record established in 1929. Commercial production of domestic clay products in 1940 was reported from every province except Prince Edward Island; no output of these materials has as yet been recorded for the Yukon and Northwest Territories. Of the total value of sales in 1940, Ontario and Quebec firms contributed \$2,508,540 and \$1,546,246 respectively.

Sales of building brick in 1940 totalled 191,213 thousand, valued at \$3,277,187. Sewer pipe shipments aggregated \$1,152,603; hollow blocks, roofing and floor tile, \$803,948; drain tile, \$277,551 and pottery, including earthenware, \$474,452.

Fireclay was mined in Nova Scotia, Saskatchewan and British Columbia and sales of this material totalled 4,881 short tons valued at \$30,564. Firebrick made from Canadian clays in 1940 numbered 3,167 thousand worth \$165,525. Bentonite shipments during the year under review amounted to 1,469 short tons valued at \$4,488.

The number of firms reported as active in the Canadian domestic clay products industry totalled 139 in 1940, of which 75 were located in Ontario, 19 in Quebec, 12 in British Columbia, 12 in Alberta and the balance in Nova Scotia, New Brunswick, Saskatchewan and Manitoba. Capital employed by the industry as a whole was reported at \$17,146,443, employees numbered 2,557 and salaries and wages paid amounted to \$2,675,251. Fuel and electricity used during 1940 were appraised at \$1,282,593 and chemicals and various other process supplies consumed were valued at \$139,635.

Imports into Canada in 1940 of clay and its products, in all forms, were valued at \$11,125,118 compared with \$7,934,630 in 1939. Of the 1939 imports, \$3,610,781 came from the United Kingdom and \$3,887,187 from the United States; corresponding data for 1940 are not published.

Exports in 1940 of clay and clay products made in Canada were appraised at \$498,047 compared with \$542,788 in 1939.

The following information is from an annual report for 1940 as prepared by the Bureau of Mines, Ottawa:

"The largest producing area in Canada of stoneware clay or semi-fireclays lies in the vicinity of Eastend and Willows, Saskatchewan, where large quantities of the clays are selectively mined and shipped to Medicine Hat, Alberta, to be extensively utilized (owing to the availability of cheap gas fuel) in the manufacture of stoneware, sewer pipe and pottery.

"Stoneware clays and moderately refractory fireclays occur near Shubenacadie and Musquodoboit, Nova Scotia. A small amount of the Musquodoboit clay is used for the production of pottery, but there has been no extensive exploitation of these clays for ceramic use.

"Stoneware clays or low-grade fireclays are known to occur near Williams Lake, and Chimney Creek Bridge in British Columbia; in the Cypress Hills of Alberta, and near Swan River, Manitoba, but as yet there has been little or no development, owing to their comparative inaccessibility.

"Two large plants and a few small plants in Canada manufacture fireclay refractories from domestic clay. One, about 50 miles south of Vancouver, British Columbia, extracts a high grade, moderately plastic fireclay (by underground mining) from the clay beds in the Sumas Mountain, and manufactures firebrick and other refractory materials. Another plant at Claybank, Saskatchewan, by selective mining, utilizes the highly plastic refractory clays from the "White Mud" beds of southern Saskatchewan.

"A small amount of the most refractory clays in the deposits near Shubenacadie is mined and used by the steel plant at Sydney, Nova Scotia for refractory purposes and the Musquodoboit clay is utilized to some extent for stove linings. Except for a few small concerns manufacturing refractory specialties, and companies producing firebrick, blocks, etc., for their own use, all other manufacturers of fireclay refractories in Canada utilize imported clay.

"China clay has been produced commercially in Canada only from the vicinity of St. Remi d'Amherst, Papineau county, Quebec, where a group of open pits were operated for several years prior to 1923. In 1937 a reorganized company was formed to extract the kaolinized material by underground mining and to refine it into high grade china clay, washed silica sand forming a by-product. A shaft has been sunk to a depth of 365 feet, and a mill erected to carry out the washing process in accordance with the most modern methods. In 1931 a nearby property was developed, mainly for the production of silica sand, but a small amount of china clay has also been produced.

"Important deposits of high grade, plastic white-burning clays, and buff-burning clays occur in the Mattagami, Abitibi, and Missinaibi rivers in northern Ontario. Some may be classed as china clays, some as fireclays, and others as ball clays. They have aroused much interest in recent years, but have not as yet been commercially developed, owing to their remoteness from industrial centres, and the lack of transportation facilities.

"In British Columbia, along the Fraser river, about 25 miles above Prince George, is an extensive deposit of high grade clay, parts of which yield a grade of china clay that compares favourably with the best china clays found on this continent. Transport by barge to railway has been considered but as yet little development has taken place.

"In the manufacture of such products as porcelain, sanitary ware, dinner ware, ceramic floor and wall tile, etc., china clay imported from England is used almost entirely. In addition to clay for ceramic use, large annual importations of china clay are made into Canada for use in the production of fine paper, in the rubber industry, and for other industrial purposes. The imports of china clay in 1940 were valued at \$483,399, compared with \$376,750 for the previous year.

"Ball clays of high bond strength occur in the white mud beds of southern Saskatchewan but as yet these have not been developed to any extent.

Common clays suitable for the production of building brick and tile are to be found in all the provinces of Canada.

"Compared to world production, the value of clay products manufactured in Canada is very small, and large quantities of the various kinds of ceramic products are imported annually. The total value of manufactured ceramic products imported into Canada was \$9,677,723 in 1940, compared with \$6,992,382 in 1939."

Table 265.—Production of Clay Products in Canada from Domestic Clays, by Provinces, 1931-1940 (Gross Values)

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1931.....	467,126	143,348	2,360,908	3,552,800	122,628	166,257	529,716	498,505	7,841,288
1932.....	172,557	68,151	1,064,551	1,639,508	49,773	109,739	329,584	216,355	3,650,218
1933.....	125,500	46,917	580,088	1,024,579	20,966	92,207	198,373	174,205	2,262,835
1934.....	157,158	59,897	632,322	1,261,006	37,916	90,997	246,677	194,437	2,680,410
1935.....	270,478	62,478	593,162	1,370,225	74,755	98,150	326,679	216,636	3,012,563
1936.....	355,254	102,256	691,765	1,573,936	55,564	95,584	315,777	280,891	3,471,027
1937.....	406,846	123,876	1,053,153	2,033,845	95,531	115,330	338,638	349,640	4,516,859
1938.....	340,253	123,625	1,022,194	2,083,496	105,334	118,713	377,337	365,132	4,536,084
1939.....	339,952	129,985	1,274,776	2,346,638	78,892	148,774	461,079	371,140	5,151,236
1940.....	490,543	171,745	1,546,246	2,508,540	102,906	164,828	838,856	520,883	6,344,547

Table 266.—Production (Sales) of Domestic Clay and Clay Products in Canada, 1939 and 1940

Products	Unit of measure	Sales or shipments			
		1939		1940	
		Quantity	\$	Quantity	\$
Clay—Fullers' earth.....	ton				
Bentonite.....	ton	988	3,441	1,469	4,488
Fireclay.....	ton	10,045	30,824	4,881	30,564
Kaolin (china clay).....	ton				
Other clay.....	ton	3,114	9,412	16,543	27,310
Fireclay blocks and shapes.....	\$		95,256		85,127
Firebrick.....	M	2,331	119,346	3,167	165,525
Brick—Soft mud process—Face.....	M	10,927	182,376	15,946	323,634
Common.....	M	26,652	372,116	40,395	611,750
Stiff mud process—Face.....	M	45,993	941,696	41,552	903,636
(wire cut) Common.....	M	51,114	692,224	52,777	738,416
Dry press—Face.....	M	12,263	242,518	14,932	333,717
Common.....	M	17,790	236,597	24,870	351,335
Fancy or ornamental brick (including special shapes, embossed and enamelled brick).....	M	68	4,601	47	2,477
Sewer brick.....	M	217	4,506	694	12,222
Paving brick.....	M	157	6,089	19	819
Structural tile—					
Hollow blocks (including fireproofing and load-bearing tile).....	ton	86,120	714,291	105,073	788,478
Roofing tile.....	No.	148,291	4,964	41,772	1,839
Floor tile (quarries).....	Sq. ft.	90,812	15,233	(a)	13,631
Ceramic or glazed floor and wall tile.....	\$				
Drain tile.....	M	14,361	353,973	10,550	277,551
Sewer pipe (including copings, flue linings, etc.).....	\$		813,208		1,152,603
Pottery, glazed or unglazed (including coarse earthenware, sanitary ware, stoneware, flower pots, and all other pottery).....	\$		282,712		474,452
Other products.....	\$		25,853		44,973
Total.....	\$		5,151,236		6,344,547

(a) Not available.

NOTE.—In addition to the clays recorded in this table, there were 105,982 tons of ordinary clay consumed in Canada during 1939 in the production of Portland cement; the corresponding consumption in 1940 was 144,152 short tons. Also consumed by the Canadian cement industry in 1940 were 18,347 short tons of shale.

Table 267.—Production of Building Brick in Canada, 1931-1940

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1931.....	M	5,476	41,177	77,135	81,930	20,149	8,688	335	2,253	237,143
	\$	116,316	619,357	1,752,947	1,205,464	423,357	107,213	20,773	43,692	4,289,119
1932.....	M	6,188	12,801	30,197	40,753	5,522	4,248	125	643	100,477
	\$	108,582	182,372	664,756	638,922	119,547	46,762	6,237	12,156	1,779,334
1933.....	M	2,482	12,389	19,602	23,894	4,544	3,916	630	243	67,700
	\$	41,737	156,769	412,367	356,498	101,252	44,377	7,824	3,693	1,124,517
1934.....	M	4,904	14,256	23,800	30,317	6,005	6,440	43	307	86,972
	\$	76,247	183,585	494,341	424,131	130,392	66,616	2,625	5,992	1,383,929
1935.....	M	6,695	21,197	25,289	32,334	8,454	6,381	13	175	100,538
	\$	122,215	259,504	500,066	437,123	175,042	55,253	728	5,236	1,555,167
1936.....	M	6,097	24,180	30,218	35,592	8,961	10,241	25	418	115,732
	\$	111,378	302,690	575,765	484,078	165,924	100,785	1,374	6,778	1,748,782
1937.....	M	9,904	23,636	37,610	55,689	12,565	14,136	55	175	153,770
	\$	175,544	316,534	735,615	755,630	233,542	152,662	2,972	2,777	2,375,276
1938.....	M	10,838	24,104	34,179	50,734	13,125	15,536	63	228	148,807
	\$	208,610	313,082	671,471	681,744	268,039	192,741	4,175	3,581	2,341,443
1939.....	M	10,927	26,652	45,993	51,114	12,263	17,790	68	217	165,024
	\$	182,376	372,116	941,696	692,224	242,518	236,597	4,601	4,506	2,676,634
1940.....	M	15,946	40,395	41,552	52,777	14,932	24,870	47	694	191,213
	\$	323,634	611,750	903,636	738,416	333,717	351,335	2,477	12,222	3,277,187

Table 268.—Production of Building Brick in Canada—Per Capita of Population for Years Specified

Year	M per capita	Year	M per capita
1905.....	0.087	1934.....	0.008
1914.....	0.070	1935.....	0.009
1924.....	0.035	1936.....	0.010
1929.....	0.046	1937.....	0.014
1930.....	0.031	1938.....	0.013
1932.....	0.010	1939.....	0.015
1933.....	0.006	1940.....	0.017

Table 269.—Production of Paving Brick in Canada, 1931-1940

Year	Quantity M	Value \$
1931.....	19	682
1932.....	6	155
1933.....	1	42
1934.....	10	382
1935.....	15	627
1936.....	116	3,149
1937.....	3	131
1938.....	1	34
1939.....	157	6,089
1940.....	19	819

Table 270.—Production of Structural Tile in Canada, 1931-1940

Year	Hollow Blocks (*)		Roofing Tile		Floor Tile (Quarries)	
	Short tons	\$	No.	\$	Sq. ft.	\$
1931.....	105,635	1,046,634	6,935	720	107,499	31,415
1932.....	48,118	421,672	48,939	3,900	94,316	21,502
1933.....	26,747	160,059	20,469	1,136	91,495	14,297
1934.....	31,136	244,122	44,115	1,852	80,356	17,491
1935.....	(a) 47,195	344,608	82,015	3,669	51,765	7,629
1936.....	58,501	467,860	52,730	2,139	97,738	13,798
1937.....	64,526	533,843	60,542	3,302	73,191	12,169
1938.....	70,648	591,416	150,504	5,196	100,958	15,330
1939.....	86,120	714,291	148,291	4,964	90,812	15,233
1940.....	105,073	788,478	41,772	1,839	(b)	13,631

(*) Including fireproofing and load-bearing tile.

(a) In addition, there was produced \$615 worth of ceramic tile.

(b) Data not available.

Table 271.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1931-1940

Year	Value	Year	Value
	\$		\$
1931.....	1,508,803	1936.....	588,485
1932.....	813,224	1937.....	790,210
1933.....	354,458	1938.....	778,107
1934.....	436,433	1939.....	813,208
1935.....	481,559	1940.....	1,152,603

Table 272.—Production of Drain Tile in Canada, 1931-1940

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1931.....	12,518	328,410	1936.....	8,148	214,549
1932.....	7,385	186,670	1937.....	11,391	298,970
1933.....	10,057	222,829	1938.....	12,862	322,774
1934.....	7,325	180,553	1939.....	14,361	353,973
1935.....	7,124	205,336	1940.....	10,550	277,551

Table 273.—Production of Pottery† from Domestic Clays in Canada, 1931-1940

Year	Value	Year	Value
	\$		\$
1931.....	257,125	1936.....	218,402
1932.....	244,861	1937.....	232,209
1933.....	202,500	1938.....	235,890
1934.....	228,733	1939.....	*280,420
1935.....	220,711	1940.....	474,452

† Including coarse earthenware, stoneware, flower pots, and all other pottery.

* In addition \$2,292 worth of sanitaryware was produced.

Table 274.—Production of Kaolin* and Fireclay in Canada, 1931-1940

Year	Kaolin		Fireclay		Year	Kaolin		Fireclay	
	Quantity	Value	Quantity	Value		Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$		Tons	\$	Tons	\$
1931.....			1,233	14,857	1936.....			2,437	17,639
1932.....			990	11,826	1937.....			4,123	26,081
1933.....			1,421	11,273	1938.....			2,344	17,243
1934.....	48	504	1,043	12,598	1939.....			10,045	30,824
1935.....	170	1,520	2,272	15,574	1940.....			4,881	30,564

* Produced in province of Quebec.

Table 275. Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1931-1940

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1931.....	2,248	107,597	83,039	1936.....	2,538	118,923	65,171
1932.....	1,580	71,757	75,209	1937.....	2,950	142,827	75,431
1933.....	1,547	73,226	80,625	1938.....	2,213	113,581	73,512
1934.....	2,109	101,219	62,388	1939.....	2,331	119,346	95,256
1935.....	1,817	90,149	71,344	1940.....	3,167	165,525	85,127

BENTONITE

(Bureau of Mines, Ottawa)

Bentonite, mainly of the highly colloidal, "swelling" type, is widely distributed over large areas of the Prairie Provinces, where it occurs at several horizons in the upper Cretaceous sediments. The more important known deposits are exposed mainly in areas dissected by drainage channels where they show as beds in the slopes bordering valleys, and in the sides or on top of small buttes in typical "bad-land" topography. Thus, many of the chief exposures are found in the Red Deer Valley section of Alberta; over a wide area in southern Saskatchewan; and in the district around Morden, in southern Manitoba. One lower-lying bed is met with as a persistent parting in the No. 1 or main coal seam mined at a number of points in the Drumheller district, Alberta, as well as near Cluny, further to the east. Other exposures exist in the Edmonton region, Alberta, and further west, on the McLeod river, near Edson.

In British Columbia, a deposit of unusual thickness occurs in Tertiary beds near Merritt, and at Princeton.

Until a few years ago, comparatively little interest had been shown in Canadian bentonite and most of the small production had come from the Princeton occurrence in British Columbia, from which a few cars were shipped annually to Vancouver for grinding and local consumption, mainly in gasoline refining. Some six years ago, attention became directed to the Morden deposits and there have since been occasional small shipments, most of which went to the local foundry trade at Winnipeg. In 1940, Pembina Mountain Clays, Limited, was incorporated by Winnipeg interests to undertake more active development, and a small drying and grinding plant was erected at Winnipeg to supply foundry clay. The bentonite of this district has been reported to possess high bleaching power in its natural state, without activation, and the company plans to engage also in the production of clay for the packing house and oil refining industries.

The largest tonnage of bentonite produced in Canada has come from the Drumheller district, in the Red Deer valley, Alberta, where, since 1937, several concerns have been engaged in shipping clay for use in oil well drilling in the Turner Valley field. The larger part of such output has come from the Gordon L. Kidd property at Drumheller, being shipped to a drying and grinding plant at Calgary operated by the Calgary Mud Company, who market their product under the trade name "Altamud". The remainder has been obtained mainly from coal mines operated by the Aetna Coal Company, at East Coulee, and Wayne Coal Producers Association, at Wayne, the material being shipped to a small plant at Longview, in Turner Valley, for processing and sale under the trade name "Viscolite". Shipments from the above concerns in 1940 totalled about 750 tons; total production to date from the area has been about 3,000 tons.

There has as yet been little attempt to exploit occurrences in Saskatchewan, but a small trial shipment was made some years ago from a deposit near Eastend.

Canada exports little or no bentonite. Substantial quantities of activated clay of the Filtrol type are imported from the United States for bleaching purposes in oil refineries and for packing-house products, as well as, possibly, some ground natural bentonite for similar use. There are also considerable imports of American ground bentonite for foundry use and for other minor industrial purposes. Imports of activated clay, for oil refining, in 1940, were valued at \$196,467, with no record of quantity.

Outside of the three main above-listed uses, viz., for bleaching, oil-well drilling, and foundry work, bentonite finds a variety of minor industrial applications, most of which call for the colloidal, or "swelling", type. It is employed as an emulsifying agent in asphaltic and resinous compounds; in soaps and detergents, as well as in a variety of cosmetic and pharmaceutical preparations; as a suspending, spreading, and adhesive agent in horticultural sprays and insecticides; as a plasticizing ingredient in ceramic bodies, slips, and glazes, and in plasters; to improve the flow and workability of concrete; and in the clarifying of wines, vinegar, etc. Increasing amounts are being used for water-sealing, in order to stop seepage through or around dam abutments, reservoir walls, and sides or irrigation ditches, and structural foundations. A further growing use is as a coagulant in clarifying the water used in paper mills and sewage disposal plants, as well as to remove turbidity in domestic and industrial water supplies. Research directed to

producing a mica substitute from bentonite films has been actively pursued during the last couple of years, but at latest report the product ("Alsifilm") was still in the development stage. Some very fine (micron-size) material is used in paper coatings.

War demands greatly stimulated bentonite sales in the United States for general foundry work in 1939-1940, both for domestic use and export, and producing plants were working at full capacity. Canada probably possesses ample reserves of bentonite of foundry quality to supply domestic requirements, but freight costs to the main consuming centres have proved an obstacle to development in the face of low-priced material from the United States. Wyoming dried and ground 200-mesh clay currently sells for \$8 per ton, f.o.b., in bulk, and \$10 bagged, whereas, similar material from Alberta has been quoted at \$38. Selected, air-floated Wyoming clay is priced at \$25 per ton, f.o.b. Chicago. Freight rates from Wyoming points to Montreal are about \$13.50 per ton. Activated bentonite has sold for \$65 to \$75 per ton, in carload lots, delivered eastern Canadian points.

Table 276.—Production (Sales) of Bentonite in Canada, 1931-1940

Year	Bentonite (*)	
	Tons	\$
1931.....	187	935
1932.....	7	176
1933.....	55	1,363
1934.....	63	1,578
1935.....	41	781
1936.....	(a) 120	180
1937.....	163	1,971
1938.....	1,179	3,659
1939.....	988	3,441
1940.....	1,469	4,488

(*) All from British Columbia 1930-1936, inclusive: 1937 includes 132 tons at \$1,154 produced in Manitoba and 31 tons at \$817 in British Columbia. In 1938 Alberta production 1,136 tons, British Columbia 43 tons; in 1939 Manitoba 99 tons at \$591 and Alberta 889 tons at \$2,850. 1940—Alberta 714 tons \$2,240; British Columbia 45 tons \$225; Manitoba 710 tons at \$2,023.

(a) Partly for experimental purposes.

Table 277.—Fuller's Earth Used in Canada in the Manufacture of Soaps and Washing Compounds and in the Petroleum Products Industry, 1931-1940

Year	Petroleum Products Industry		Soaps and Washing Compounds	
	Pounds (*)	\$	Pounds	\$
1931.....	16,157,582	201,361	492,174	6,264
1932.....	19,642,179	258,934	507,807	7,444
1933.....	22,811,655	314,515	588,434	8,501
1934.....	18,588,514	239,357	508,316	6,562
1935.....	18,487,148	260,885	660,018	13,694
1936.....	18,907,295	243,164	1,328,219	20,601
1937.....	18,843,458	240,309	1,167,768	20,393
1938.....	19,867,467	281,668	1,195,208	19,575
1939.....	19,814,473	304,214	1,586,163	30,924
1940.....	23,828,660	406,185	1,651,471	40,695

(*)Includes all clay.

Table 278.—China Clay (Kaolin) Used in the Manufacture of Paper in Canada, 1931-1940

Year	Tons	Value	Year	Tons	Value
		\$			\$
1931.....	11,484	173,660	1936.....	39,165	520,121
1932.....	14,432	205,068	1937.....	41,738	578,223
1933.....	20,048	267,014	1938.....	34,968	488,147
1934.....	27,550	357,286	1939.....	32,769	430,092
1935.....	33,766	422,584	1940.....	36,931	558,659

Table 279.—Clays and Earths Used in Canadian Rubber Industry, 1933-1940

Year	Tons	Value	Year	Tons	Value
		\$			\$
1933.....	1,391	32,361	1937.....	3,614	79,300
1934.....	2,391	54,368	1938.....	2,942	81,935
1935.....	2,639	63,553	1939.....	3,438	80,745
1936.....	3,017	70,709	1940.....	3,586	90,867

Table 280.—Fuller's and Infusorial Earth Used in Specified Canadian Industries, 1932-1940

Year	Sugar refineries		Vegetable oil mills	
	Pounds	\$	Pounds	\$
1932.....	(a)	(a)	102,650	1,673
1933.....	(a)	(a)	126,880	2,730
1934.....	(a)	(a)	115,120	2,171
1935.....	(a)	(a)	88,980	2,425
1936.....	(b) 59,200	1,730	243,720	10,044
1937.....	(c) 4,586,786	95,532 (†)	212,997	9,349
1938.....	(c) 4,908,597	101,473	190,253	9,063
1939.....	(c) 44,819,811	105,711 (b)	207,105	10,166
1940.....	(c) 4,984,362	112,369 (b)	216,254	7,731

(a) Not recorded. (b) Fullers' earth. (c) Infusorial earth. (†) Includes other earth.

NOTE.—In addition to the consumption recorded, there is a considerable quantity of Fuller's earth used in the slaughtering industry.

Table 281.—Firebrick and Fireclay Used in the Manufacture of Iron and Steel and Their Products in Canada, 1931-1940

Year	Firebrick		Fireclay		Cupola blocks
	Number	Value	Number	Value	
		\$		\$	\$
1931.....	4,326,000	197,684	7,631	64,300	45,393
1932.....	3,409,000	123,532	5,910	52,492	36,395
1933.....	1,846,016	141,784	7,615	62,602	11,628
1934.....	2,590,452	192,538	8,248	75,906	21,488
1935.....		451,604	11,510	101,601	28,064
1936.....				\$ 779,014	
1937.....				\$1,058,787	
1938.....				\$ 838,012	
1939.....				\$ 939,495	
1940.....				\$4,681,943	

PRICES—(a)

Bentonite—per ton, carload lots, f.o.b. Wyoming mines, dried and crushed, in bulk, \$8; in bags, \$10; f.o.b. Chicago, selected air-floated, \$25.

China Clay (Kaolin)—per ton, f.o.b. South Carolina and Georgia mines, in bulk: saggar clays, \$2.50 to \$3.50; tailings, \$4.50 to \$5.00. No. 2 grades, \$5.50 to \$6.00; No. 1 grades, air-floated, crude, \$6.75 to \$8.00; No. 1 washed, \$8.00. Florida: washed, crushed, bulk, \$11.75; air-floated and washed, \$14 to \$15. Maryland: ball clays, shredded bulk, \$3.75 to \$8.25; air-floated, in paper bags, \$15 to \$18.25. New Jersey: Plastic kaolin, pulverized, in paper bags, \$10.25 to \$10.75. Insecticide clay, \$11.50 to \$16.50. Imported English, per long ton, C and F. American ports: lump, \$26 to \$28 in bulk; air-floated \$40 to \$60 nominal.

Fuller's Earth—per ton, f.o.b. Colorado, \$9; f.o.b. Georgia or Florida, 30 to 60 mesh, \$14.50; 15 to 30, \$14; 200 and up, \$10; 100 and up \$7.

(b) **Fuller's Earth**—English, carlots, tons, to \$29.00; Georgian, carlots—to \$21.00. June, 1941—prices nominal.

(c) **China Clay**—Imported, carlots—bulk—ton \$20.00 to \$25.00. Pigment clay for rubber—carlots—bags—ton—\$20.00 to \$25.00, less carlots, to \$23. **Kaolin** (refined grades) lb. 4 cents—12 cents.

(a) Engineering and Mining Journal's "Metal and Mineral Markets" — New York, June, 1941.

(b) "Canadian Chemistry and Metallurgy" — Toronto, November, 1939.

(c) Engineering and Mining Journal's "Metal and Mineral Markets" — New York, August, 1940.

Table 282.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1940

Industry and Province	Capital employed as represented by:					
	Present value of land†	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	Total
	\$	\$	\$	\$	\$	\$
By INDUSTRIES—						
*Brick and Tile—						
Nova Scotia.....	115,904	590,442	42,430	48,814	107,231	904,821
New Brunswick.....	19,567	157,044	498	21,703	26,899	225,711
Quebec.....	381,557	2,509,967	56,119	396,689	520,162	3,864,494
Ontario.....	1,290,303	3,990,117	147,643	693,991	1,439,208	7,561,262
Manitoba.....	17,850	134,293	7,629	24,120	74,062	257,954
Saskatchewan.....	250,080	422,449	17,389	35,514	61,602	787,034
Alberta.....	188,505	1,465,512	72,955	114,310	191,635	2,032,917
British Columbia.....	122,170	466,435	22,679	124,463	199,484	935,231
Total for Canada.....	2,385,936	9,736,259	367,342	1,459,604	2,620,283	16,569,424
Stoneware and pottery—						
Total for Canada.....	41,777	344,172	35,448	55,381	100,241	577,019
By PROVINCES—						
Total for clay and clay products.....	115,904	590,442	42,430	48,814	107,231	904,821
New Brunswick.....	19,567	169,080	3,165	29,446	32,659	253,917
Quebec.....	381,557	2,509,967	56,119	396,689	520,162	3,864,494
Ontario.....	1,302,303	4,010,117	149,083	700,255	1,456,620	7,618,378
Manitoba.....	17,850	134,293	7,629	24,120	74,062	257,954
Saskatchewan.....	250,080	422,449	17,389	35,514	61,602	787,034
Alberta.....	215,282	1,769,848	103,996	152,684	267,704	2,509,514
British Columbia.....	125,170	474,235	22,979	127,463	200,484	950,331
Canada.....	2,427,713	10,080,431	402,790	1,514,985	2,720,524	17,146,443

*Clay, sewer pipe, firebrick products and other clays included under brick and tile.

† Excluding unmined material.

Table 283.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1940

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....	11	128	139	35,529	105,984	141,513
New Brunswick.....	5	65	70	7,915	50,330	58,245
Quebec.....	59	511	570	139,610	460,418	600,028
Ontario.....	138	900	1,038	254,697	875,565	1,130,262
Manitoba.....	7	61	68	16,395	39,987	56,382
Saskatchewan.....	10	38	48	20,537	39,327	59,864
Alberta.....	43	368	411	86,960	309,817	396,777
British Columbia.....	23	190	213	44,270	187,910	232,180
Canada.....	1,296	2,261	2,557	605,913	2,069,338	2,675,251

* See note, page 30.

† Includes 35 female salaried workers.

Table 284.—Average Number of Wage-earners, by Months, 1939 and 1940

Month	1939	1940	
		Pit	Plant
January.....	838	93	1,097
February.....	743	89	962
March.....	990	97	1,190
April.....	1,358	121	1,618
May.....	2,286	312	2,335
June.....	2,741	437	2,706
July.....	2,879	423	2,768
August.....	2,761	417	2,610
September.....	2,428	359	2,453
October.....	2,047	284	2,246
November.....	1,975	199	2,101
December.....	1,572	138	2,013

2. Products from Imported Clays

This industry covers the operations of Canadian plants which were occupied chiefly in making ceramic products from imported clays. Products made in these plants during 1940 included high tension insulators, vitreous china sanitary ware, china dinnerware, firebrick, sewer pipe, floor and wall tile, refractory cements, electrical porcelains, etc.

Twenty-one plants reported in this group for 1940 and their output was valued at \$4,503,791, against last year's total of \$2,971,979 and the 1938 figure of \$3,048,888. Capital employed amounted to \$5,359,190. The average number of workers was 1,381 and payments for salaries and wages totalled \$1,573,610. Fuel and electricity cost \$302,773 and materials for use in manufacturing processes cost \$1,084,669.

Table 285.—Products Made in the Imported Clay Products Industry, 1939 and 1940

Products	1939	1940
	Gross selling value at works	Gross selling value at works
	\$	\$
Firebrick and stove linings—Rigid.....	403,893	534,943
Plastic.....	83,095	146,904
High temperature cements.....	36,280	87,418
High tension porcelain insulators, china sanitary ware, clay sewer pipe, floor and wall tile, pottery, china tableware, etc. (Separate figures cannot be shown for these items as there were only one or two producers in each case).....	2,448,711	3,734,526
Total.....	2,971,979	4,503,791

NOTE.—Clay firebrick, floor tile, sewer pipe and pottery are also made in Canada from domestic clays. High temperature cements and refractory bricks are made also by concerns in other industries.

Table 286.—Materials Used in the Imported Clay Products Industry, 1939 and 1940

Material	1939		1940	
	Short tons	Total cost at works	Short tons	Total cost at works
		\$		\$
Imported clays—Ball clay.....	2,970	48,994	3,348	58,300
China clay.....	2,973	51,427	3,382	72,182
Fireclay.....	21,721	127,663	34,153	203,744
Saggar clay.....	453	4,909	904	12,776
Other imported clays.....	1,125	18,000	4,782	16,151
Canadian clays—Fireclay.....	192	1,722	2	20
Other clays.....	95	645	100	1,900
Feldspar.....	2,021	38,840	3,305	70,788
Silica and ground quartz.....	1,968	27,161	3,426	53,690
Talc.....	178	2,502	511	7,635
Other glazing materials.....		25,796		35,773
Insulator hardware.....		206,221		238,076
Shipping containers and packing materials.....		100,155		105,349
All other materials.....		138,732		208,285
Total.....		792,767		1,084,669

LIME

Production of quick and hydrated lime in Canada during 1940 totalled 716,730 short tons valued at \$5,194,555 compared with 552,209 short tons at \$4,003,514 in 1939. The 1940 output comprised 623,803 short tons of quick lime valued at \$4,421,758 and 92,927 short tons of hydrated lime worth \$772,797. During the year under review, 568,479 tons of quick lime and 44,421 tons of hydrated lime were sold or used by lime producers for chemical purposes while the balance of Canadian lime production, totalling 103,830 tons and consisting of both quick and hydrated was sold or used for building, agricultural and other purposes.

Stone used in the production of lime in Canada included calcium, high calcium and dolomitic varieties of limestone. It is estimated that about 1,200,000 tons of limestone were utilized in the production of lime in 1940. Lime was produced in all Canadian provinces in 1940 with the exception of Prince Edward Island and Saskatchewan; no commercial production was reported in the Territories. Of the total Canadian output of lime in 1940, Ontario plants produced 372,634 tons or 52 per cent and Quebec 233,419 tons or 33 per cent. Imports of lime into Canada in 1940 came entirely from the United States and totalled 4,126 short tons valued at \$23,352; exports of lime during the same period amounted to 23,617 tons at \$121,340.

During 1940 the industry reported 55 plants as active; capital employed totalled \$5,107,739 and \$1,003,671 in salaries and wages were distributed to 962 employees. The cost of fuels and purchased electricity used amounted to \$1,424,047 and the value of explosives, chemicals and other process supplies consumed aggregated \$177,499.

Lime is marketed in the form of quicklime and in the hydrated state, the latter being a specially prepared slaked lime in the form of a fine powder that is marketed in 50-pound, multi-wall paper bags.

Quicklime is marketed in the lump, pebble, crushed and pulverized forms; lump lime and pebble lime are sold either in bulk or packed in barrels; crushed lime (1 inch and under) and pulverized lime (ground to minus 20 mesh, and in some plants to minus 50 mesh) are sold in airtight multi-wall paper bags.

Prices of the various lime products vary over a wide range depending on the geographical position of the plants and on differences in quality of the lime.

A review of lime in 1940 by the Bureau of Mines, Ottawa, contains the following information:

"In addition to the recently developed new use for white high-calcium lime in the making of calcium carbonate filler for newsprint and magazine paper, a number of other new uses for Canadian lime have been developed lately, several of them in connection with the manufacture of war materials. Recent research in the United States on stabilization of clay-soil roads with hydrated lime has shown that on certain clays better results are obtained with lime than with other stabilizing materials.

"During 1940, Gypsum, Lime and Alabastine Canada Limited, further increased the capacity of its chemical lime plant at Beachville, Ontario, by the addition of a new, vertical, gas-fired kiln, and the three large kilns of this type are now being supplied with producer gas instead of natural gas. The new kilns are regarded as being among the most modern shaft kilns on this continent and they represent a notable advance in the technology of manufacturing lime in vertical kilns.

"Aged lime putty and lime mortar for use in building construction are now available in a number of Canadian cities. Lime mortar is coming back into favour as a binder in masonry, and sales of lime for this purpose have increased very considerably within the past two years and, with the present high degree of activity in the construction industry, are expected to increase further in the coming year.

"There are many prospective lime-producing localities in Canada because of the abundance of suitable limestone throughout the country. With the northward development of the mining industry, considerable interest is being manifested in making lime from limestone deposits in the far north."

Table 287.—Production of Lime in Canada, 1930-1940

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1930.....	490,802	4,038,698	1936.....	468,401	3,335,970
1931.....	344,785	2,764,415	1937.....	549,353	3,824,917
1932.....	320,650	2,394,537	1938.....	486,922	3,542,652
1933.....	323,540	2,432,306	1939.....	552,209	(a) 4,003,514
1934.....	368,113	2,745,797	1940.....	716,730	(b) 5,194,555
1935.....	405,419	2,925,791			

(a) Includes 263,957 tons used by producers.

(b) Includes 357,550 tons used by producers.

Table 288.—Production of Lime in Canada, by Provinces, 1940, Showing Purposes for Which Used (*) or Sold

	Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
QUICKLIME						
(1 ton=2,000 pounds)						
Building trades—						
Finishing lime.....ton		615	3,677	3,548	173	8,013
	\$	5,450	24,302	33,656	4,070	67,478
Masons' lime.....ton	1,925	7,651	11,868	1,270		22,714
	\$	16,700	75,784	100,340	12,562	205,356
Sand-lime brick.....ton		1,993	6,126			8,119
	\$	8,895	39,434			48,319
Agriculture.....ton	196	21	42		97	356
	\$	1,818	175	247	502	2,742
CHEMICAL—						
Smelters (non-ferrous).....ton			777	2,652	45	3,474
	\$		4,276	26,520	417	31,213
Iron and steel furnaces.....ton	23,885	1,675	34,218		336	60,114
(a).....\$	200,933	13,067	239,689		3,115	456,804
Cyanide mills (gold mines).....ton		4,963	19,000	6,144	379	30,486
	\$	34,408	113,489	49,618	3,514	201,029
Pulp and paper mills.....ton	8,558	98,494	6,580	8,356	13,082	135,070
	\$	69,908	565,772	43,462	57,407	840,805
Glass works.....ton			8,496			8,496
	\$		56,101			56,101
Sugar refineries.....ton	200	22	9,534	10,146	410	20,312
	\$	1,800	230	84,134	3,802	171,056
Tanneries.....ton		924	3,131	2		4,057
	\$	6,168	20,485	20		26,673
Fertilizer plants.....ton			242			242
	\$		1,767			1,767
Insecticide plants.....ton			994		231	1,225
	\$		6,975		2,142	9,117
Other chemical works.....ton	155	75,561	229,017	270		305,003
	\$	1,450	542,604	1,602,889	3,240	2,150,183
Uses unspecified.....ton		5,612	769	1,294	8,447	16,122
	\$	55,316	6,070	13,379	78,320	153,085
Total quicklime.....ton	34,919	197,531	334,471	33,682	23,200	623,803
	\$	292,609	1,307,869	2,340,606	280,536	4,421,758

Table 288.—Production of Lime in Canada, by Provinces, 1940, Showing Purposes for which Used (*) or Sold (Concluded)

		Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
HYDRATED LIME		(1 ton=2,000 pounds)					
Building trades—							
Finishing lime.....	ton	56		19,301	5,005		24,362
	\$	560		239,235	82,009		321,804
Masons' lime.....	ton	815	1,050	7,786			9,651
	\$	6,842	10,316	67,007			84,165
Sand-lime brick.....	ton						
Agriculture.....	ton	1,246	751	3,045		3,239	8,281
	\$	11,014	6,328	30,937		21,475	69,754
CHEMICAL—							
Smelters (non-ferrous).....	ton		65	3,942	20	873	4,900
	\$		682	37,665	200	5,787	44,334
Iron and steel furnaces.....	ton		20,821	91			20,912
	\$		62,463	886			63,349
Cyanide mills.....	ton		1,959	377	145	74	2,555
	\$		9,794	4,251	1,450	491	15,986
Pulp and paper mills.....	ton	5,875	5,530	70			11,475
	\$	45,425	44,468	753			90,646
Sugar refineries.....	ton	22	152	110			284
	\$	198	1,292	1,148			2,638
Tanneries.....	ton		405	854			1,259
	\$		3,150	5,193			8,343
Fertilizer plants.....	ton		25				25
	\$		150				150
Insecticide plants.....	ton	317		10	6	42	375
	\$	2,853		95	60	278	3,286
Other chemical works.....	ton		370	2,085	181		2,636
	\$		3,167	21,659	3,012		27,838
Uses unspecified.....	ton		4,760	492		960	6,212
	\$		30,787	3,352		6,365	40,504
Total Hydrated Lime.....	ton	8,331	35,888	38,163	5,357	5,188	92,927
	\$	66,892	172,597	412,181	86,731	34,396	772,797
Grand Total.....	ton	43,250	233,419	372,634	39,039	28,388	716,730
	\$	359,501	1,480,466	2,752,687	367,267	234,534	5,194,555

(a) Includes calcined dolomite used as a refractory material.

(*) Not necessarily consumed in provinces where produced.

NOTE.—Of the total quantity of 716,730 tons of lime produced, 357,550 tons were consumed by the producers themselves

Table 289.—Lime Sold or Used for Chemical and Other Purposes and Value of Contracts In Canada, 1930-1940

Year	Lime sold or used for chemical purposes		Lime sold or used for building or other non- chemical purposes		Value of con- struction contracts awarded in Canada (a)
	short tons	\$	short tons	\$	\$
1930.....	351,443	2,596,112	139,359	1,442,586	456,999,600
1931.....	231,837	1,637,319	112,948	1,127,098	315,482,000
1932.....	255,472	1,758,898	65,178	635,639	132,872,400
1933.....	235,810	1,664,946	87,730	767,360	97,289,800
1934.....	229,906	1,598,906	138,207	1,146,891	125,811,500
1935.....	260,885	1,775,657	144,534	1,150,134	160,305,000
1936.....	389,324	2,670,266	79,077	665,704	162,588,000
1937.....	466,796	3,112,147	82,557	712,770	224,056,700
1938.....	403,825	2,746,927	83,097	795,725	187,277,900
1939.....	455,148	3,059,306	97,061	944,208	187,178,500
1940.....	612,900	4,201,318	103,830	993,237	346,009,800

(a) Compiled by McLean Building Reports Ltd.

(b) 349,940 short tons quicklime and 39,384 short tons hydrated lime.

(c) 421,867 tons quicklime and 44,929 short tons hydrated lime.

(d) 373,278 tons quicklime and 30,547 short tons hydrated lime.

(e) 424,287 tons quicklime and 30,861 tons hydrated lime.

(f) 568,479 tons quicklime and 44,421 tons hydrated lime.

Table 290.—Number of Firms, Employees, Salaries and Wages and Net Value of Lime (Quick and Hydrated) Sold or Used, by Provinces, 1940

Province	Number of firms	Number of employees		Salaries and wages	Fuel, electricity and process supplies used	Production Net value
		Salaried employees	Wage-earners			
				\$	\$	\$
New Brunswick (†).....	6	7	118	138,955	81,031	278,470
Quebec.....	18	25	349	331,726	693,816	786,650
Ontario.....	17	23	236	324,229	684,001	2,068,786
Manitoba.....	3	5	84	74,229	75,199	142,348
Alberta.....	3	5	27	38,508	38,082	111,638
British Columbia.....	3	12	71	96,024	29,417	205,117
Canada.....	50	77	885	1,003,671	1,601,546	3,593,009

(†) Includes data for two firms operating in Nova Scotia.

Table 291.—Capital Employed in the Lime Industry in Canada, by Provinces, 1940

Province	Capital employed as represented by:					
	Present cash value of land	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of stone on hand, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$	\$
New Brunswick (x).....	25,500	121,100	14,800	5,500	42,400	209,300
Quebec.....	50,000	662,963	269,044	8,290	294,037	1,284,334
Ontario.....	161,437	1,961,742	252,775	9,524	37,058	2,422,536
Manitoba.....	.....	500,756	34,902	7,388	.....	543,046
Alberta.....	2,500	163,042	9,864	5,930	33,136	214,472
British Columbia.....	5,000	221,191	43,283	32,096	132,481	434,051
Canada.....	244,437	3,630,794	624,668	68,728	539,112	5,107,739

(x) Includes data for 2 firms in Nova Scotia.

Table 292.—Number of Wage-earners on Payroll or Time Record on the 15th of Each Month of Nearest Representative Date, 1940

Month	Quarry	Kiln	Month	Quarry	Kiln
January.....	275	440	July.....	390	590
February.....	271	463	August.....	372	596
March.....	274	497	September.....	365	582
April.....	316	530	October.....	378	594
May.....	366	563	November.....	328	597
June.....	370	554	December.....	326	536
			Average.....	340	545

SAND-LIME BRICK INDUSTRY

Four plants in Ontario and one in Quebec made sand-lime building brick during 1940. Their production, including building blocks and bricks, was valued at \$319,909, an increase of 51 per cent over 1939, which in turn was 38 per cent over 1938.

These 5 works, representing an investment of \$385,930, gave employment to a monthly average of 103 people who were paid \$116,442 in salaries and wages. Expenditures for fuel and electricity amounted to \$28,939 and for processing materials to \$116,983.

Production of sand-lime brick amounted to 17,405 M valued at \$196,423, an increase in both quantity and value over the output of 11,805 M brick at \$133,168 the previous year. Production value of sand-lime building blocks dropped to \$47,565 from \$67,407.

Table 293.—Products Made, 1939 and 1940

Products	1939		1940	
	Quantity	Selling value at works	Quantity	Selling value at works
		\$		\$
Sand-lime brick.....M	11,805	133,168	17,405	196,423
Sand-lime building blocks.....M		67,407		47,565
Other products (*).....		11,648		75,921
Total.....		212,223		319,909

(*) Includes some cinder blocks.

Table 294.—Materials Used in Manufacturing, 1939 and 1940

Materials	Unit of measure	1939		1940	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Cement, Portland.....	bbl.	1,630	3,801	6,773	14,941
Quicklime.....	ton	4,192	31,303	5,237	42,328
Sand and gravel.....	cu. yd.	34,639	29,101	53,823	44,340
Cinders.....	cu. yd.	2,106	1,579	6,216	5,019
Other materials.....			403		10,355
Total.....			66,187		116,983

SAND AND GRAVEL INDUSTRY

Commercial production of sand and gravel in Canada during 1940 totalled 31,375,415 short tons valued at \$11,759,245 compared with 31,294,341 short tons at \$11,241,102 in 1939. In the totals for both 1940 and the preceding year are sand and gravel derived from all sources, including recoveries by dredges and material used by railroads as ballast.

Quebec and Ontario are Canada's largest sand and gravel producing provinces, the output in these provinces in 1940 being, respectively, 12,177,624 short tons and 9,678,745 short tons; in 1940, the quantity of material washed or screened at Canadian sand and gravel plants totalled 3,589,933 short tons compared with 2,754,122 short tons in 1939, while the quantity of bank or pit-run grades amounted to 27,785,482 short tons as against a corresponding tonnage of 28,540,219 in the preceding year.

Of the total sand and gravel output in 1940, there were 21,465,961 tons used for concrete, roads, etc., and 3,834,904 tons as railway ballast. In addition, there were produced 1,961,604 tons of straight sand for building, etc.; 29,602 tons for moulding; 2,115 tons as core sand and 51,340 tons for other purposes. The quantity of crushed gravel produced during the year under review amounted to 2,998,843 tons and 1,031,046 tons of sand were employed as mine fill.

Firms reported as active in the Canadian sand and gravel industry numbered 1,458 in 1940; of these, 889 were located in Quebec, 484 in Ontario, 29 in British Columbia and lesser numbers in Nova Scotia, New Brunswick, Manitoba, Saskatchewan and Alberta. Capital employed by the industry totalled \$3,456,502; employees were reported at 4,243; salaries and wages paid totalled \$3,744,585; fuel, electricity and process supplies used aggregated \$291,008 and the total net value of production was estimated at \$11,468,237.

The following is from a report prepared by the Bureau of Mines, Ottawa:

"Deposits of gravel and sand are numerous throughout Eastern Canada, with the exception of Prince Edward Island, where gravel is scarce. Owing to the widespread occurrence of gravel and

sand and to their bulk in relation to value, local needs for these materials are usually supplied from the nearest deposits, as their cost to the consumer is governed largely by the length of haul. Hence the large number of small pits and the small number of large plants. Some grades of sand particularly suitable for certain industries command a much higher price than does ordinary sand.

"Road improvement, concrete works and railway ballast absorb by far the greater part of the gravel and sand used. Gravel in particular has proved a good material for building all-weather roads at low cost and its use has steadily increased with the growth of motor traffic.

"A considerable tonnage of sand and gravel is also used in the mines for re-filling underground workings. Some mines use several thousand tons a day.

"Most of the gravel used for road work comes from pits worked for that purpose. Usually a portable or semi-portable plant is used to extract enough gravel to supply the immediate need and then a sufficient reserve is built up, in the form of stock piles, for two years' requirements. Road pits may remain idle for two years or more. The amount of gravel produced from year to year thus fluctuates, depending on the program of road construction and improvement. Intermittent operation also applies to railway pits, which may remain idle for several years.

"Part of the gravel used is crushed, screened and in some cases even washed and the proportion thus processed is increasing steadily. Some Provincial Highway Departments have used crushed instead of pit-run gravel on their main highways for a number of years. Most of the large commercial plants are equipped for producing crushed gravel, a product than can compete with crushed stone.

"The amount of sand consumed follows the trend of building activity, as most of it is used in the building industry for concrete work, cement and lime mortar, or wall plaster. The sand must be clean, that is, free from dust, loam, organic matter or clay, and contain but little silt, and is usually obtainable from local deposits.

"Other important uses of sand are for moulding in foundries, filtering of water supply, and glass making, all of which require special grades of sand.

"Every province except New Brunswick and Prince Edward Island produces natural bonded moulding sand. A small production came formerly from New Brunswick, one deposit being operated in 1918 and another in 1921 and 1922. A small production, of a grade suitable only for light weight castings, also came from Prince Edward Island. By far the greater part of the production has always been in Ontario in the Niagara peninsula, from Niagara to and around Hamilton. Occasionally new deposits have been opened up, mostly in Ontario and the western provinces.

"It is estimated that 50 to 60 per cent of our consumption of natural bonded moulding sand is imported, mostly from the United States. Moulding sands as well as other sands and gravels enter Canada duty free.

"Small quantities of moulding sands not tabulated in official records are produced in nearly all the provinces by foundrymen for their own use from nearby deposits; or by small part-time operators, such as, farmers for local foundries."

Table 295.—Production(*) of Sand and Gravel in Canada, 1931-1940

Year	Tons	\$	Year	Tons	\$
1931.....	21,748,586	6,651,165	1936.....	22,124,160	6,921,399
1932.....	14,469,942	4,480,596	1937.....	27,001,301	10,492,696
1933.....	11,738,823	4,464,285	1938.....	32,223,882	12,002,554
1934.....	14,854,159	4,035,477	1939.....	31,294,341	11,241,102
1935.....	21,213,489	6,389,440	1940 (†).....	31,375,415	11,759,245

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these are recorded under quartz. Also does not include natural sand used for back filling at mines prior to 1936.

(†) Includes 3,840,844 tons valued at \$660,627 produced by railroad companies.

Table 296.—Production in Canada of Sand and Gravel, 1940 and 1939

		Washed or screened	Bank or pit-run	Total value
		Tons	Tons	\$
PRODUCTION (*)—	1940			
Sand—				
Moulding sand.....		17,852	11,750	30,538
Building sand and sand for concrete, roadwork, etc.....		723,864	1,237,740	537,937
Core sand.....		2,031	84	3,119
Mine filling.....		8,058	1,022,988	150,209
Othersand (including blast sands, engine sands, etc.).....		3,313	48,027	20,395
Sand and Gravel—				
Sand and gravel for railway ballast.....		105,175	3,729,729	699,518
Sand and gravel for concrete, roadbuilding, etc.....		2,110,401	19,355,560	9,100,612
Crushed gravel.....		619,239	2,379,604	1,216,917
Total.....		3,589,933	27,785,482	11,759,245
Cost of fuel, electricity and process supplies used.....				291,008
Total net value.....				11,468,237
PRODUCTION (*)—	1939			
Sand—				
Moulding sand.....		6,410	11,208	18,652
Building sand and sand for concrete, roadwork, etc.....		594,336	575,563	364,829
Core sand.....		1,404	137	2,122
Mine filling.....			1,452,993	194,332
Othersand (including blast sands, engine sands, etc.).....		14,251	39,227	13,425
Sand and Gravel—				
Sand and gravel for railway ballast.....		318,262	2,905,456	603,288
Sand and gravel for concrete, roadbuilding, etc.....		1,487,619	21,412,132	8,988,114
Crushed gravel.....		331,840	2,143,503	1,056,340
Total.....		2,754,122	28,540,219	11,241,102
Cost of fuel, electricity and process supplies used.....				274,509
Total net value.....				10,966,593

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these are recorded under quartz in the bulletin—The Feldspar and Quartz Mining Industry.

Table 297.—Production of Sand and Gravel in Canada, by Railway Operators, 1939 and 1940

Kind	1939		1940	
	Tons	Value	Tons	Value
Sand—		\$		\$
Moulding sand.....	120	180		
Building sand and sand for concrete, roads, etc.....			312	40
Other sand (including blast and engine sands).....	35,761	5,350	44,115	8,951
Sand and gravel—				
Sand and gravel for railway ballast.....	2,812,315	449,366	3,574,525	612,492
Sand and gravel for concrete, roads, etc.....	77,895	13,991	37,132	6,953
Crushed gravel.....			184,760	32,191
Total.....	2,926,091	468,887	3,840,844	660,627

Table 298.—Production of Sand and Gravel in Canada, by Operators, Other than Railways, 1939 and 1940

Kind	1939			1940		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
Sand—	Tons	Tons	\$	Tons	Tons	\$
Moulding sand.....	6,410	11,088	18,472	17,852	11,750	30,538
Building sand and sand for concrete, roads, etc.....	594,336	575,563	364,829	723,864	1,237,428	537,897
Core sand.....	1,404	137	2,122	2,031	84	3,119
Other sand (including blast, and engine sands).....	14,251	3,466	8,075	3,313	3,912	11,444
Sand and gravel—						
Sand and gravel for railway ballast.....	318,262	93,141	153,922	105,175	155,204	87,026
Sand and gravel for concrete, roads, etc.....	1,487,619	21,334,237	8,974,123	2,110,401	19,318,428	9,093,659
Mine filling.....		1,452,993	194,332	8,058	1,022,988	150,209
Crushed gravel.....	331,840	2,143,503	1,056,340	619,239	2,194,844	1,184,726
Total.....	2,754,122	25,614,128	10,772,215	3,589,933	23,944,638	11,098,618

Table 299.—Production of Sand for Building and Concrete, Roads, etc., and Sand and Gravel for Railway Ballast and for Concrete, Roads, etc., 1931-1940

Year	Sand		Sand and gravel			
	For building, concrete, roads, etc.		For railway ballast		For concrete, roads, etc.	
	Tons	\$	Tons	\$	Tons	\$
1931.....	3,189,428	1,069,210	3,593,451	459,531	14,352,283	4,784,298
1932.....	2,368,304	745,091	2,097,224	324,648	9,604,113	3,181,105
1933.....	775,412	218,559	561,538	110,449	9,957,832	3,907,911
1934.....	686,631	209,002	1,454,618	266,292	12,418,408	3,411,751
1935.....	787,412	264,435	2,267,195	415,092	17,531,047	5,357,331
1936.....	956,502	362,542	6,318,681	1,054,703	14,336,640	5,216,942
1937.....	1,356,269	476,824	2,764,639	533,876	19,453,188	8,340,764
1938.....	1,750,187	685,976	2,359,703	443,936	22,513,256	9,101,882
1939.....	1,169,899	364,829	3,223,718	603,288	22,899,751	8,988,114
1940						
Nova Scotia.....			176,310	27,961	1,262,633	837,166
New Brunswick.....	12,462	2,290	374,179	51,260	393,759	200,200
Quebec.....	1,437,529	355,351	873,627	151,997	7,728,264	1,809,298
Ontario.....	379,455	113,377	1,275,573	229,869	6,616,218	3,314,187
Manitoba.....	18,844	7,740	368,488	74,991	1,357,369	711,220
Saskatchewan.....	17,066	8,232	248,911	67,214	961,416	517,768
Alberta.....	24,114	20,667	237,789	38,750	1,456,465	1,009,506
British Columbia.....	72,134	30,280	280,027	57,476	1,689,837	701,267
Canada.....	1,961,604	537,937	3,834,904	699,518	21,465,961	9,100,612

Table 300.—Production of Sand and Gravel in Canada, by Provinces, 1940

	Nova Scotia	New Brunswick	Quebec	Ontario	Mani- toba	Sask- atchewan	Alberta	British Columbia
Sand—								
Moulding sand.....tons	1,197			27,947	446			12
\$	2,363			27,762	353			60
Building sand and sand for concrete, roadwork, etc.....tons		12,462	1,437,529	379,455	18,844	17,066	24,114	72,134
\$		2,290	355,351	113,377	7,740	8,232	20,667	30,280
Core sand.....tons				2,031	84			
\$				3,058	61			
Other sand (including blast sand, engine sand, etc.).....tons		1,040	11,763	12,878		17,512	4,097	4,050
\$		130	2,236	13,847		3,200	744	738
Sand and gravel—								
Sand and gravel for railway ballast.....tons	176,310	374,179	873,627	1,275,573	368,488	248,911	237,789	280,027
\$	27,961	51,260	151,997	229,869	74,991	67,214	38,750	57,476
Sand and gravel for concrete, roads, etc.....tons	1,262,633	393,759	7,728,264	6,616,218	1,357,369	961,416	1,456,465	1,689,837
\$	837,166	200,200	1,809,298	3,314,187	711,220	517,768	1,009,506	701,267
Mine filling.....tons				1,022,988		8,058		
\$				148,209		2,000		
Crushed gravel.....tons		162,593	2,126,441	341,655	106,414	219,922		41,818
\$		24,830	809,049	175,217	45,628	142,939		19,254
Total.....tons	1,440,140	944,033	12,177,624	9,678,745	1,851,645	1,472,885	1,722,465	2,087,878
Gross value.....\$	867,490	278,710	3,127,931	4,025,026	839,993	741,353	1,069,667	809,075

Table 301.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1940

	Capital employed as represented by:					Total
	Present cash value of the land*	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	
	\$	\$	\$	\$	\$	\$
	(a)	(a)	(a)	(a)	(a)	(a)
Nova Scotia.....	5,000					5,000
New Brunswick.....	53,225	55,502	2,625	2,420	16,150	129,922
Quebec.....	198,534	997,398	38,663	80,477	523,254	1,838,326
Ontario.....	325,611	133,258	19,315	9,499	195,402	683,085
Manitoba.....	11,050	87,028		200	68,285	166,563
Saskatchewan.....	1,612	20,263		300	32,964	55,139
Alberta.....	149,520	333,688	9,766	4,285	81,208	578,467
British Columbia.....						
Canada.....	744,552	1,627,137	70,369	97,181	917,263	3,456,502

* Excluding unmined materials.

(a) Not available.

Includes value of dredges.

Table 302.—Employees, Salaries and Wages in the Sand and Gravel Industry, by Provinces, 1940

Province	Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....		149	149		142,066	142,066
New Brunswick.....		319	319		170,616	170,616
Quebec.....	19	2,376	2,395	18,804	2,103,122	2,121,926
Ontario.....	33	300	333	50,698	330,006	380,704
Manitoba.....	18	350	368	49,989	238,031	288,020
Saskatchewan.....	13	295	308	18,150	238,176	256,326
Alberta.....	4	203	207	22,225	200,232	222,457
British Columbia.....	16	148	164	32,830	129,640	162,470
Canada.....	103	4,140	4,243	192,696	3,551,889	3,744,585

Table 303.—Average Number of Wage-earners, by Months, 1939 and 1940

	1939	1940
January.....	203	274
February.....	245	268
March.....	340	346
April.....	821	629
May.....	11,054	3,275
June.....	13,444	8,182
July.....	13,591	11,504
August.....	12,451	11,526
September.....	10,253	8,644
October.....	5,199	3,372
November.....	1,032	886
December.....	382	628

THE STONE INDUSTRY IN CANADA

The Stone Industry in Canada comprises two main divisions:—1. THE STONE QUARRYING INDUSTRY, including quarries and dressing works operated in conjunction with quarries, and 2. THE STONE PRODUCTS INDUSTRY, comprising the operations of firms having no quarries but who operate dressing works where stone for building and monumental purposes is cut, polished or otherwise finished. In the Census of Industry, statistics on the stone quarrying industry are included under mining, while statistics of the Stone Products industry are included under manufactures. For convenience this report carries data for both of these industries.

These two major divisions, constituting the Canadian stone industry, represented a capital investment of \$16,825,174 in 1940. Production during the year totalled \$10,991,582 which figure includes the value of the quarry output and the value added by manufacturing in the secondary stone industry. Salaried employees and wage-earners employed in 1940 numbered 3,947 and their combined earnings amounted to \$4,016,528.

The two industries are treated separately in the following review.

1. Primary Production—The Stone Quarrying Industry

The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks, including limestones, sandstones and marbles are quarried at various points in Canada. The products from quarries operating in these different formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their increasing requirements.

The gross value of all varieties of stone produced in Canada during 1940 totalled \$7,398,959 compared with \$6,475,696 in 1939. Comprising the tonnage shipped in 1940 were 1,147,747 tons of granite valued at \$1,884,410; 6,108,591 tons of limestone at \$5,126,075; 13,739 tons of marble at \$75,409; 176,475 tons of sandstone at \$305,543 and 1,113 tons of slate worth \$7,522. Of the total value of stone sold in 1940, the value of Quebec shipments amounted to 38 per cent, Ontario 46 per cent and British Columbia 6 per cent.

The number of firms in the stone quarrying industry reported as active in 1940 totalled 482; capital employed amounted to \$12,127,271; employees numbered 2,886; salaries and wages paid aggregated \$2,779,703 and the cost of fuel, electricity and process supplies used was reported at \$1,204,375.

Data relating to imports and exports of stone in 1940 are not published and for information relating to same, communications should be addressed to the External Trade Branch of the Dominion Bureau of Statistics.

Table 304.—Production (Sales) of Stone from Canadian Quarries, by Kinds and by Provinces, 1940 and 1939

Province	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
1940						
Nova Scotia..... tons	87,975	24,160		69,316		181,451
\$	155,458	46,717		111,469		313,644
New Brunswick..... tons	1,326	159,812		5,015		166,153
\$	69,833	206,916		33,550		310,299
Quebec..... tons	366,662	2,287,384	8,767	92,378	639	2,755,830
\$	792,708	1,854,423	50,652	129,179	639	2,827,601
Ontario..... tons	529,440	3,302,596	4,792	3,446		3,840,274
\$	704,421	2,649,809	22,157	11,008		3,387,395
Manitoba..... tons	218	48,488				48,706
\$	4,324	74,116				78,440
Alberta..... tons		3,981				3,981
\$		11,999				11,999
British Columbia..... tons	162,126	282,170	180	6,320	474	451,270
\$	157,666	282,095	2,600	20,337	6,883	469,581
Canada..... tons	1,147,747	6,108,591	13,739	176,475	1,113	7,447,665
\$	1,884,410	5,126,075	75,409	305,543	7,522	7,398,959
1939						
Nova Scotia..... tons	885	17,239		31,711		49,835
\$	20,809	33,941		79,167		133,917
New Brunswick..... tons	1,492	52,505		21,412		75,409
\$	72,005	142,927		51,175		266,107
Quebec..... tons	503,011	1,904,658	7,600	112,403	683	2,528,355
\$	1,276,859	1,726,653	168,612	150,792	683	3,323,599
Ontario..... tons	495,619	1,931,285	6,519	4,124	47	2,437,594
\$	625,880	1,624,618	30,642	16,322	649	2,298,111
Manitoba..... tons	174	35,969				36,143
\$	3,544	80,404				83,948
Alberta..... tons		2,888	5	155		3,048
\$		8,166	800	5,314		14,280
British Columbia..... tons	101,214	205,045		6,460	419	313,138
\$	120,404	200,842		29,060	5,428	355,734
Canada..... tons	1,102,395	4,149,589	14,124	176,265	1,149	5,443,523
\$	2,119,501	3,817,551	200,054	331,830	6,760	6,475,696

(a) All igneous rocks included.

(b) Includes dolomite, also marl for agricultural purposes.

NOTE.—Not included in the above limestone statistics are 1,765,944 tons of limestone consumed in the cement industry in 1940 and 1,379,858 tons in 1939. Limestone used in the Canadian lime industry is also not included; it is estimated that approximately 1,280,949 tons of limestone were burned in the manufacture of lime in 1940 and more than 900,000 tons in 1939.

Table 305.—Production* of Stone in Canada, by Provinces, Showing Purposes for which Used, 1940 (a)

Item	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
Building—								
Rough.....tons	51,211	522	5,246	11,287	1,600		1,015	70,881
\$	102,425	2,234	16,583	49,434	20,578		8,731	199,985
Dressed.....tons		1,000	23,191	1,880	64		320	26,455
\$		31,000	456,148	18,566	2,478		14,337	522,529
Monumental and ornamental..								
Rough.....tons	285	328	3,858	795			20	5,286
\$	6,039	1,375	33,990	15,156			400	56,960
Dressed.....tons	280	476	1,459	15	156		284	2,670
\$	27,000	66,224	97,405	489	2,276		32,027	225,421
Flagstone.....tons		15	74	824	210			1,123
\$		150	162	3,487	1,340			5,139
Curbstone.....tons			844	539				1,383
\$			4,142	1,617				5,759
Paving blocks.....tons			144	8,239				8,383
\$			1,165	16,000				17,165
Lining open-hearth furnaces.....tons				34,565				34,565
\$				24,518				24,518
Chemical—								
Flux in iron and steel furnaces.....tons			3,656	159,464	4,522			167,642
\$			8,052	120,533	8,365			136,956
Flux in non-ferrous smelters.....tons				94,092			69,420	163,512
\$				66,184			37,262	103,446
Glass factories.....tons			121			1,613		1,734
\$			692			2,016		2,708
Pulp and paper mills.....tons	3,839	5,500	112,459	38,176	1,396		87,385	248,755
\$	11,741	9,900	121,086	35,286	1,536		135,531	315,080
Sugar refineries.....tons		20			10,144			10,164
\$		80			12,251			12,331
Other chemical uses.....tons				133,878				133,878
\$				111,275				111,275
Pulverized stone—								
Whiting (substitute).....tons				900				900
\$				9,600				9,600
Asphalt filler.....tons	426	421	6,564	5,900				13,311
\$	2,556	1,473	25,200	16,055				45,284
Dusting coal mines.....tons						610		610
\$						2,440		2,440
Agricultural purposes.....tons	19,193	47,941	91,245	15,859		896	420	175,554
\$	31,720	109,673	99,157	29,792		3,584	1,305	275,231
Other uses.....tons			11,605	13,450	2,633	38	116	27,842
\$			3,555	49,060	3,329	152	1,244	57,340
Crushed stone for artificial stone.....tons			375	425				800
\$			1,942	1,584				3,526
Roofing granules.....tons			639	12,930			474	14,043
\$			639	106,983			6,883	114,505
Poultry grit.....tons		50	280	1,565	619	808	56	3,378
\$		500	1,539	7,555	1,750	3,783	261	15,388
Stucco dash.....tons			947	300	55		82	1,384
\$			6,329	1,200	266		1,655	9,450
Terrazzo chips.....tons			2,717	2,057				4,774
\$			12,987	9,847				22,834
Rock wool.....tons				5,825				5,825
\$				6,451				6,451
Rubble and riprap.....tons	750	4,000	277,249	22,251			148,464	452,714
\$	743	2,400	174,625	13,168			107,699	298,635
Crushed stone—								
Concrete aggregate.....tons	25,400	100,000	1,212,373	1,318,404	16,901			2,673,078
\$	36,574	75,000	1,011,375	1,032,218	16,320			2,171,487
Road metal.....tons	80,067	5,880	803,532	1,265,453	8,451	16	137,214	2,300,613
\$	94,846	10,290	628,605	1,030,532	5,201	24	116,246	1,885,744
Railroad ballast.....tons			197,252	691,201	1,955		6,000	896,408
\$			122,223	610,799	2,750		6,000	741,772
Total.....tons	181,451	166,153	2,755,830	3,840,274	48,706	3,981	451,270	7,447,665
\$	313,644	310,299	2,827,601	3,887,395	78,440	11,999	469,581	7,398,959
Per cent of total.....Quantity	2.44	2.23	39.01	51.56	0.65	0.05	6.06	100.00
Value	4.24	4.19	38.22	45.78	1.06	0.16	6.35	100.00

NOTE.—See footnote to table 304.

* Sales or shipments from quarries.

(a) Includes the production of slate.

Table 306.—Production (Sales) of Stone from Canadian Quarries by Kinds Showing Purposes for Which Used, 1940

For use as follows:	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
Building stone—Rough..... tons	54,214	15,095	58	1,514		70,881
..... \$	120,372	70,885	3,070	5,658		199,985
Dressed..... tons	10,908	13,281	131	2,135		26,455
..... \$	255,527	192,183	19,680	55,139		522,529
Monumental and ornamental stone—						
Rough..... tons	5,230	4	52			5,286
..... \$	55,176	80	1,704			56,960
Dressed..... tons	2,623	47				2,670
..... \$	223,203	2,218				225,421
Flagstone..... tons	137	585		401		1,123
..... \$	310	1,943		2,886		5,139
Curbstone..... tons	844			539		1,383
..... \$	4,142			1,617		5,759
Paving blocks..... tons	8,383					8,383
..... \$	17,165					17,165
Lining open-hearth furnaces..... tons		34,565				34,565
..... \$		24,518				24,518
Chemical—						
Flux in iron and steel furnaces..... tons		167,476	166			167,642
..... \$		136,598	358			136,956
Flux in non-ferrous smelters..... tons		163,512				163,512
..... \$		103,446				103,446
Glass factories..... tons		1,613	121			1,734
..... \$		2,016	692			2,708
Pulp and paper mills..... tons		248,755				248,755
..... \$		315,080				315,080
Sugar refineries..... tons		10,164				10,164
..... \$		12,331				12,331
Other chemical uses..... tons		133,878				133,878
..... \$		111,275				111,275
Pulverized Stone—						
Whiting (substitute)..... tons		900				900
..... \$		9,600				9,600
Asphalt filler..... tons		13,311				13,311
..... \$		45,284				45,284
Dusting coal mines..... tons		610				610
..... \$		2,440				2,440
Agricultural purposes and fertilizer plants..... tons		174,114	1,440			175,554
..... \$		272,161	3,070			275,231
Other uses..... tons		27,464	378			27,842
..... \$		55,228	2,112			57,340
Crushed stone for manufacture of artificial stone..... tons			800			800
..... \$			3,526			3,526
Roofing granules..... tons	12,406	524			1,113	14,043
..... \$	105,709	1,274			7,522	114,505
Poultry grit..... tons	2	1,877	1,499			3,378
..... \$	57	8,211	7,120			15,388
Stucco dash..... tons	2	55	1,327			1,384
..... \$	55	266	9,129			9,450
Terrazzo chips..... tons		1,290	3,484			4,774
..... \$		5,650	17,184			22,834
Rock wool..... tons		5,825				5,825
..... \$		6,451				6,451
Rubble and riprap..... tons	168,274	267,934	3,980	12,526		452,714
..... \$	126,302	156,862	7,562	7,909		298,635
Crushed stone—						
Concrete aggregate..... tons	288,703	2,352,153		32,222		2,673,078
..... \$	341,581	1,784,808		45,098		2,171,487
Road metal..... tons	160,819	2,018,353	303	121,138		2,301,613
..... \$	186,714	1,517,592	202	181,236		1,885,744
Railroad ballast..... tons	435,202	455,206		6,000		896,408
..... \$	448,097	287,675		6,000		741,772
Total Canada (b)..... tons	1,147,747	6,108,591	13,739	176,475	1,113	7,447,665
..... \$	1,884,410	5,126,075	75,409	305,543	7,522	7,398,959

(a) Includes all igneous rock.

(b) Does not include limestone used in Canadian lime and cement industries, but includes marl used for agricultural purposes.

GRANITE

"The stone quarried in this industry consists of granite and related crystalline igneous rocks used for building, decorative, ornamental, or constructional purposes. Producing properties are situated in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, and British Columbia. Large areas in Canada are underlain by granite, and the prospects of finding stone suitable for its various uses are good.

"Much of the granite produced in Canada is used for foundations for highways; for the permanent ballasting of railway roadbeds; for heavy aggregate in large concrete structures; for the filling of breakwaters; and for bridge piers. The marked curtailment of such operations during the past several years has seriously affected production. Production is still far below the record years.

"Granite for monumental use is produced in the Maritime Provinces and in Quebec, Ontario, Manitoba, and British Columbia, and is finding a small but steadily increasing market. Early in 1939 an appreciable amount of foreign stone, principally of the black and red varieties, was imported, mainly from Finland and Sweden, but this source of supply is now cut off. Black granite has been quarried in Canada, notably in the vicinity of Lake St. John, Quebec, and from quarries along the north shore of Lake Superior, and stone from these areas should find a ready market for monumental use. Other deposits of 'black granite' in the Maritime Provinces, Quebec, Ontario, and Manitoba show promise of yielding stone of good quality.

"Now that shipments from the Scandinavian countries to the United States and to Canada have been discontinued, Canadian producers would be well advised to give careful study to the market possibilities of a monumental stock, especially for the black and red varieties.

"In the building trade, coloured granites are being used to an increasing extent in the form of thin polished slabs for trim for buildings in which the main colour scheme calls for contrast.

"Canadian granites are suitable for all the purposes for which granite is used, and with persistent advertising there is no reason why this industry should not have a flourishing future." (Bureau of Mines, Ottawa).

Table 307.—Production of Granite(*) in Canada, 1932-1940

Year	Short tons	\$	Year	Short tons	\$
1932.....	490,822	1,110,582	1937.....	1,135,099	1,827,433
1935.....	256,723	679,585	1938.....	705,307	1,379,417
1934.....	200,285	781,739	1939.....	1,102,395	2,119,501
1935.....	326,354	1,126,287	1940.....	1,147,747	1,884,410
1936.....	941,743	1,319,313			

(*) Includes all igneous rock.

LIMESTONE

"Limestone, because of the great variety and importance of its industrial uses, is the most useful of all rocks. It is quarried in all provinces of Canada except Prince Edward Island and Saskatchewan but by far the greater part of the production comes from Ontario and Quebec.

"Limestone is available in great bedded formations and in massive highly metamorphosed deposits—the former being much more common and yielding most of the production. At present, almost all Canadian limestone is won by open pit methods, though underground mining of the rock has been adopted by several companies producing limestone for chemical and metallurgical uses and for making lime. Underground mining will undoubtedly become more common, particularly for the production of high-grade stone for chemical use, as the readily accessible parts of deposits become worked out.

"Of significance in connection with future production of pure limestone is the progress being made in beneficiation, whereby siliceous material is in part removed from limestone by flotation. This method of purifying limestone is now in use at several Portland cement plants in various parts of the world.

"Limestone is widely distributed and is quarried on a large scale in all industrial countries. Rarely is there any considerable international trade in it, but, because foreign limestone can be obtained more cheaply at certain large consuming centres in Canada than the domestic, considerable quantities are imported from the United States and Newfoundland for use as blast furnace flux, and from the United States alone for road metal, and for use in some pulp mills in Ontario near the International Boundary. Comparatively small tonnages are exported to the United States for use in agriculture and in sugar refineries. No separate record is maintained of the trade in limestone.

"For domestic use limestone is marketed in a variety of forms ranging from huge squared blocks of dimension stone used in construction, to extremely fine dust used chiefly as a mineral filler. Some few of the products are processed but little if at all from the condition in which the rock is obtained from the quarry, as for example limestone used in the wood pulp industry, but the bulk of the output is crushed and screened for use as road metal, concrete aggregate, railroad ballast, and as flux in metallurgical plants. Large quantities are used in the manufacture of Portland cement, lime, and various chemical products. Argillaceous dolomite is used in the manufacture of rock wool. This industry is steadily expanding in Canada and in 1940 its output was valued at over \$1,000,000.

"New uses for limestone are continually being developed. The dolomitic variety when crushed or when calcined has long been used as a refractory material for fettling the bottoms of basic open-hearth furnaces, but its applications as a refractory have been limited because of the readiness with which it air-slakes and also because of its chemical activity. Recently, however, a method has been found of combining dolomite (and also calcium limestone) with silica in the presence of a stabilizing agent to give a refractory product that contains no active lime or silica, does not disintegrate, and is claimed to be comparable in refractoriness with materials that are several times as expensive. Dolomite is assuming a position of importance in Europe as a raw material for making metallic magnesium, where after being calcined it is used to precipitate magnesium from sea-water. Processes are also being developed to extract magnesium directly from calcined dolomite. Canada possesses ample deposits of high-grade dolomite and developments are being watched with interest in this country. A present use for limestone, capable of enormous development, is in agriculture. Though the necessity of applying limestone or lime to agricultural land in order to maintain or increase soil fertility has been emphasized for years by authorities on agriculture, the quantity so used in Canada is still very small, whereas, if the proper quantity were applied it would constitute one of the principal outlets for limestone.

"Limestone in blocks of large dimensions for sawing into building stone is quarried in Quebec, Ontario, and Manitoba. In Quebec, quarries at St. Marc des Carrières, Portneuf county, produce grey limestone, and several in and near Montreal yield limestone of similar colour. In Ontario, a large quarry near Queenston in the Niagara peninsula yields silver-grey limestone as well as small quantities of buff and of variegated buff and grey; and at Longford Mills, near Orillia, buff, silver-grey, and brown limestone for use both as marble and as building stone is available. The Manitoba quarries are near Tyndall and yield mottled buff, mottled grey, and mottled variegated limestone. Besides these large quarries, the products of which have a wide shipping range, small quarries producing building stone for local use are worked near Quebec City, Montreal, and Hull in the province of Quebec; and at Ottawa, Kingston, Erin, and Warton in Ontario. Rubble is their chief product.

"Prices of limestone in the mill block f.o.b. quarry have remained almost stationery in recent years, and range from 50 cents to \$1 per cubic foot, depending on the size of block and grade of stone." (Bureau of Mines, Ottawa).

Table 308.—Production of Limestone in Canada, 1932-1940

Year	Short tons	\$	Year	Short tons	\$
1932.....	3,687,241	3,227,715	1937.....	5,542,806	4,673,942
1933.....	2,572,911	2,142,516	1938.....	4,288,507	3,864,619
1934.....	3,747,779	3,157,832	1939.....	4,149,589	3,817,551
1935.....	3,631,665	3,253,573	1940.....	6,108,591	5,126,075
1936.....	3,731,548	3,143,872			

Table 30.—Production in Canada and Imports of Rock Wool, 1932-1940

	Production \$	Imports	
		Pounds	\$
1932 (From October 12).....		309,791	5,301
1933.....		2,230,762	38,262
1934.....	1,709	2,987,611	69,267
1935.....	66,459	1,922,938	57,877
1936.....	265,472	2,391,504	101,592
1937.....	346,460	2,030,144	81,050
1938.....	396,261	1,337,954	45,109
1939.....	525,998	1,820,763	44,860
1940.....	935,229	2,082,589	52,233

Producers of Rock Wool in Canada, 1940

Canadian Johns Manville Co. Ltd.	Asbestos, Que.
Canadian Gypsum Co. Ltd.	Weston, Ont.
Gypsum, Lime & Alabastine Ltd.	Toronto, Ont.
Insulation Products Ltd.	Todmorden, Ont.
Ottawa Silica & Sandstone Ltd.	East Templeton, Que.
Spun Rock Wools Ltd.	Thorold, Ont.

MARBLE

"Marble quarries are operated in the provinces of Quebec, Ontario, Manitoba, and British Columbia. The products include squared blocks for sawing into slabs and for making monuments, and broken marble for rubble and for making terrazzo, stucco dash, whiting substitute, marble flour and artificial stone. Waste from some of the quarries is sold for chemical uses and for road metal.

"In Quebec, several varieties of clouded grey marble and also a black marble are quarried at Phillipsburg by Missisquoi Stone and Marble Company, Limited. Some brown marble used for counters and wainscoting is obtained from the building stone quarries in the Trenton limestones of St. Marc des Carrières, Portneuf county. Dolomitic white marble is quarried and crushed by White Grit Company at Portage du Fort, Pontiac county, and by Canada Marble and Lime Company at l'Annonciation, Labelle county, for the making of terrazzo chips, stucco dash, poultry grit, artificial stone, and for the chemical and ceramic uses. A small quantity of dark red marble is quarried at Cap St. Martin near Montreal, chiefly for making tombstones.

"In Ontario, black marble is quarried at St. Albert, near Ottawa, by Silvertone Black Marble Quarries, Limited. Recently a 40-inch bed of marble was uncovered in this quarry which, because of its soundness and uniformity, is suitable for making large monolithic pillars. White marble is quarried at Marmora by Bonter Marble and Calcium Company, Limited, and at Haliburton by Bolendar Brothers for making terrazzo chips, poultry grit, stucco dash, and artificial stone. Bonter Marble and Calcium Company also produces white marble in block form. Buff, red, white, green and black marbles are quarried, near Eldorado, Hastings county, by Karl Stocklosar of Madoc, for use as terrazzo.

"In Manitoba, a number of highly coloured marbles are available but there is only a small production to supply terrazzo chips and building rubble.

"In Alberta, a deposit of calcareous tufa near Radnor station on the Canadian Pacific railway has been quarried for terrazzo and a small quantity has also been marketed in block form.

"In British Columbia there are many deposits of marble but there is only a small production of white marble near Victoria and on Texada island for the production of terrazzo, poultry grit, marble sand, and whiting substitute.

"Many known deposits of beautifully coloured marbles have never been fully investigated chiefly because the present demand in Canada for marble of any one colour, other than for a staple variety, such as, white, is comparatively small.

"Imports of marble during 1940 had a value of \$84,005 compared with \$97,797 in 1939. Current imports of marble are largely in the form of unpolished slabs and in the form of sawn stock for tombstones, the finishing being done in the marble mills throughout Canada. Most of the imports of marble blocks are from the United States.

"The Canadian market calls for interior decorative marble almost entirely, and very little is used for exteriors of buildings. A considerable quantity is, however, used for tombstones. In recent years there has been an increasing demand for marble in the form of terrazzo for flooring, and many inquiries have reached the Bureau of Mines as to where marbles of various colours could be obtained." (Bureau of Mines, Ottawa).

Table 309.—Production of Marble in Canada, 1932-1940

Year	Short tons	\$	Year	Short tons	\$
1932.....	12,379	250,706	1937.....	21,642	88,595
1933.....	10,897	65,913	1938.....	19,375	87,274
1934.....	13,783	69,475	1939.....	14,124	200,054
1935.....	15,975	85,369	1940.....	13,739	75,409
1936.....	22,866	169,698			

SANDSTONE

Canadian sandstone has been utilized extensively in the construction of many important public buildings in Canada and is finding increasing favour as a material in the construction of the better type home. The rock occurs in Canada in a variety of colours, including white, reddish brown, yellow and grey. Shipments of sandstone were made in 1940 from quarries located in all of the provinces with the exception of Prince Edward Island, Manitoba and Saskatchewan.

The greater part of the output in 1940 was employed as rubble and riprap and in the crushed state for concrete, highway construction and railroad ballasting. Sandstone in British Columbia, New Brunswick and Nova Scotia has been employed in the manufacture of abrasive wheels and sharpening stones.

Table 310.—Production of Sandstone in Canada, 1932-1940

Year	Short tons	\$	Year	Short tons	\$
1932.....	500,480	349,458	1937.....	235,165	343,871
1933.....	99,043	108,562	1938.....	101,854	218,405
1934.....	115,169	143,283	1939.....	176,265	331,830
1935.....	342,824	838,005	1940.....	176,475	305,543
1936.....	285,508	495,856			

SLATE

Canadian slate production in 1940 came entirely from the provinces of Quebec and British Columbia and represented shipments of the stone in the form of granules for roofing purposes. No Canadian deposits of slate suitable for the production of high grade roofing slates or shingles have been reported as being under development in recent years.

Table 311.—Production of Slate in Canada, 1932-1940

Year	Short tons	\$	Year	Short tons	\$
1932.....	250	3,750	1937.....	900	5,519
1933.....	250	3,750	1938.....	979	6,311
1934.....	738	4,802	1939.....	1,149	6,760
1935.....	1,129	4,329	1940.....	1,113	7,522
1936.....	1,247	5,414			

Table 312.—Production of Stone for Building Purposes, Chemical Use, Cement Manufacture, Concrete Aggregate, Road Metal and Railroad Ballast, 1934-1940

—	Building stone (a)	For chemical purposes (b)	For concrete aggregate	For road metal	For railroad ballast	For cement manufacture
1934..... tons	52,665	489,580	821,099	2,062,487	345,802	806,546
\$	490,095	447,429	608,240	1,668,927	209,296	.....
1935..... tons	200,899	537,799	804,719	1,976,363	351,302	818,443
\$	1,258,741	483,709	523,847	1,987,351	211,993	.....
1936..... tons	42,335	615,207	1,014,145	1,903,927	784,081	1,180,538
\$	714,616	553,597	730,617	1,653,134	659,656	.....
1937..... tons	49,098	693,947	1,497,655	3,169,136	642,248 (c)	1,465,168
\$	746,370	626,297	1,214,181	2,522,080	570,606	.....
1938..... tons	49,666	551,737	791,971	2,721,922	86,019 (d)	1,358,689
\$	725,402	468,000	1,344,636	2,131,306	600,266 (d)	1,407,099
1939..... tons	71,288	577,278	1,109,028	1,773,337	522,882	.....
\$	1,334,340	523,579	2,673,078	2,300,613	896,408 (d)	1,784,291
1940..... tons	97,336	725,685	2,171,487	1,885,744	741,772	.....
\$	722,514	681,796				

(a) Does not include monumental or ornamental stone.

(b) Does not include limestone used in Canadian lime industry.

(c) Includes shale.

(d) Includes 13,821 tons shale in 1938, 27,241 tons in 1939 and 18,347 in 1940.

WHITING SUBSTITUTE

"Whiting substitute, as the name implies, is a material that may be used in place of chalk whiting, all of which originates in England or in Europe. Until 1940 all whiting substitute made in Canada was made from white limestone or white marble. In 1940 production of whiting substitute from white marl began by White Valley Chemicals, Limited, at Bobcaygeon, Ontario. Whiting substitute is used mostly in the manufacture of oilcloth, linoleum, in certain kinds of rubber products, in putty, and in explosives. In lesser quantities it is used in the manufacture of moulded articles, cleaning compounds and polishes, as a ceramic glaze, and for a number of other purposes.

"The products made from white marble or white limestone are pulverized to various degrees of fineness ranging from 200 to 400 mesh, and the raw material used contains very little magnesium carbonate, though in the past a whiting substitute made from white dolomite was produced in Eastern Canada for making putty.

"The principal differences between whiting and whiting substitute made from marble or limestone are that the latter is usually whiter, has a low capacity for absorbing oil, and the individual particles are sub-angular rather than rounded.

"Marl suitable for making whiting substitute should be white or nearly so, be nearly free from grit and clayey material, and have a very low content of organic matter. This last-named constituent, which is present to some extent in all deposits of marl, renders the product unsuitable for use as a filler in products such as putty and paint where it will come in contact with oils. The oil-absorptive capacity of whiting substitute made from marl is usually greater than that of whiting but in other respects the physical characteristics of the two products are much the same.

"Whiting substitute is manufactured by Pulverized Products, Limited, Montreal; by Claxton Manufacturing Company, Toronto; by White Valley Chemicals, Limited, Toronto; by Gypsum, Lime and Alabastine, Canada, Limited, Winnipeg; and by F. J. Beale, Limited, Van Anda, Texada Island, British Columbia.

"Calcium carbonate filler, a product closely akin to whiting substitute and made by introducing carbon dioxide gas into milk-of-lime made from high-calcium quicklime, has been produced in Canada for the past several years. Its use up to the present has been as a filler in newsprint and book paper, and its manufacture has been undertaken by the paper companies using it. Whiting substitute made from carefully processed white marl is said to be satisfactory for this use.

"By-product precipitated chalk, made from waste sludge resulting from the manufacture of caustic soda from soda ash and lime, is classed as a whiting substitute, but its usefulness is restricted by the fact that it almost invariably contains a small amount of free alkali. The raw materials for the manufacture of by-product precipitated chalk are available but it is not yet being made in Canada.

"No separate record is kept by the Dominion Bureau of Statistics of the production, imports, and exports of whiting substitute, but the industry has experienced a steady growth in recent years because improvements in grinding equipment and the maintenance of close technical control have enabled a product to be marketed that is very consistent in both chemical and physical properties. Many manufacturers now use the domestic product with entire satisfaction in place of imported whiting, and in the present situation when all European sources of whiting are cut off from the Canadian market because of the war, the domestic industry is largely supplying the Canadian market. Prices per ton in carload lots range from \$8.00 to \$15.00 per ton f.o.b. plants in Eastern Canada". (Bureau of Mines, Ottawa).

Table 313.—Consumption of Whiting, (and Chalk), by Uses, as Reported to the Annual Census of Industry, 1939 and 1940

Industry	1939		1940	
	Tons	Cost at works	Tons	Cost at works
Paints and pigments.....	6,733	\$ 126,042	7,378	\$ 165,162
Rubber.....	7,856	120,100	6,817	106,119
Miscellaneous textiles*.....	1,033	14,885	1,151	16,404
Explosives (a).....	264	1,824	290	2,102
Toilet preparations (†).....	112	8,350	67	7,277

* Includes oilcloth and linoleum.

(a) Chalk.

† Gound and precipitated chalk.

Table 314.—Employees, Salaries and Wages, Specified Costs and Net Values, in the Stone Industry in Canada, by Provinces, 1940

Province	Firms	Average number of employees			Salaries and wages		Cost of fuel, electricity and process supplies used	Net value of production
		Salaried employees	Wage-earners		Salaries	Wages		
	No.	Male	Female		\$	\$	\$	\$
Nova Scotia.....	47	9	.....	149	11,115	117,142	30,971	282,673
New Brunswick.....	9	13	3	130	26,009	112,724	16,097	294,202
Quebec.....	199	121	16	1,435	160,859	1,120,096	466,948	2,360,653
Ontario.....	198	79	16	690	196,835	798,170	638,120	2,749,275
Manitoba.....	6	6	.....	37	16,026	23,502	8,998	69,442
Alberta.....	2	(a)	(a)	(a)	(a)	(a)	(a)	11,999
British Columbia.....	26	18	2	162	27,715	169,510	43,241	426,340
Canada.....	482	246	37	2,603	438,559	2,341,144	1,204,375	6,194,584

(a) Data not available.

Table 315.—Capital Employed in the Stone Quarrying Industry of Canada, by Provinces, 1940

	Plants	Capital employed as represented by:					Total
		Present cash value of the land*	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	
	No.	\$	\$	\$	\$	\$	\$
Nova Scotia.....	48	29,241	192,073	10,320	6,500	34,150	272,284
New Brunswick....	9	42,900	62,873	12,447	10,386	93,865	222,471
Quebec.....	211	1,363,595	2,371,372	241,440	350,754	558,337	4,885,498
Ontario.....	197	719,939	4,096,694	160,690	161,958	535,615	5,674,896
Manitoba.....	7	45,590	264,219	16,463		63,980	390,253
Alberta.....	2	(a)	(a)	(a)	(a)	(a)	(a)
British Columbia...	86	88,495	465,103	17,832	19,599	90,841	681,870
Canada.....	560	2,289,760	7,452,334	459,192	549,197	1,376,788	12,127,271

* Excluding unmined materials. (a) Not available.

Table 316.—Average Number of Wage-earners, by Months, 1939 and 1940

Month	1939	1940		Month	1939	1940	
		Quarry	Dressing works			Quarry	Dressing works
January.....	1,532	687	328	July.....	3,914	3,315	546
February.....	1,613	899	296	August.....	3,854	3,418	580
March.....	1,785	930	349	September.....	3,602	3,111	508
April.....	2,145	1,591	432	October.....	3,221	2,670	535
May.....	3,021	2,427	476	November.....	2,745	2,329	447
June.....	3,763	2,686	516	December.....	1,888	1,600	337

2. SECONDARY PRODUCTION

THE STONE PRODUCTS INDUSTRY

In 1940 there were 177 stone dressing works whose operations were reported separately from the quarries. These plants were engaged chiefly in cutting or polishing Canadian or imported stone to produce finished monuments or cut and dressed stone for construction purposes. Retail establishments engaged only in selling and lettering monuments have not been included. Five producers of rock wool were also included in this industry.

Output from this industry was valued at \$3,592,623 in 1940, a decline of 5.6 per cent from the total of \$3,805,989 reported for the previous year. The 81 works in Ontario accounted for 58 per cent of the total output and the 46 plants in Quebec for 24 per cent. The average number of employees was 1,061 and \$1,236,825 were paid in salaries and wages. Materials used in the cutting and dressing processes, including stone, cost \$1,183,112 and expenditures for fuel and electricity amounted to \$133,417.

Table 317.—Cost of Materials Used in the Stone Products Industry, 1939 and 1940

	Cost at works	
	1939	1940
	\$	\$
Granite and marble from Canadian quarries.....	521,918	380,650
Granite and marble (imported).....	307,984	235,872
Monuments, cut and polished, for lettering only.....	106,275	99,114
All other materials.....	323,370	467,476
Total.....	1,259,547	1,183,112

Table 318.—Production from the Stone Products Industry, by Provinces, 1939 and 1940

	Granite		Marble		Marble chips and dust	Limestone		Finished monuments, lettered only	Other products	Total
	Monu-ments	For building purposes	Monu-ments	For building purposes		Monu-ments and bases	For building purposes			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Prince Edward Island and New Brunswick—										
1939.....	63,283	87	13,780			1,610		8,595	280	87,635
1940.....	61,634	3,575	13,081			1,430		6,381	700	86,801
Nova Scotia—										
1939.....	73,863	2,900	8,856	4,816				25,875	1,709	118,019
1940.....	63,013	2,846	11,334			75		26,291	1,630	105,189
Quebec—										
1939.....	323,922	281,547	15,298	76,494	37,076	4,795	119,050	34,516	138,921	1,031,619
1940.....	332,685	109,680	9,892	116,835	4,442	7,240	45,047	9,710	242,344	877,875
Ontario—										
1939.....	799,165	436	57,932	72,881	518	37,914	539,317	89,320	446,899	2,044,382
1940.....	738,932	8,159	75,740	79,305	324	7,480	391,835	50,407	748,965	2,101,147
Manitoba—										
1939.....	71,968	1,911	11,033	5,837	255	6,690	3,591	534	819	102,638
1940.....	60,514	4,088	8,490	8,673	300	2,288		25,568	1,361	111,282
Saskatchewan—										
1939.....	45,321	24,777	235	4,697			357	12,589	7,099	95,075
1940.....	42,357		29,463	275	875	6,398	295	13,228	7,930	100,821
Alberta—										
1939.....	63,924	36,660	20,154	9,250	10,031	2,100		9,719	2,964	154,802
1940.....	49,373	27,750	17,650	6,000	8,000	4,950	9,084		1,084	123,891
British Columbia—										
1939.....	72,512	90,301	2,335	300	40	200	1,955	1,680	2,496	171,819
1940.....	67,790	3,329	2,155	7,183	64		180	1,190	3,726	85,617
Canada—										
1939.....	1,513,958	438,619	129,623	174,275	47,920	53,309	664,270	182,828	601,187	3,805,989
1940.....	1,416,298	159,427	167,805	218,271	14,005	29,861	446,441	132,775	1,007,740	3,592,623

DIAMOND DRILLING INDUSTRY, 1941

The number of firms reported as actively engaged in the contract diamond drilling of Canadian mining properties in 1941 totalled 27 compared with 32 in 1940. Operations were conducted in Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia and Northwest Territories. The income received by the industry from contract drilling operations completed during the year under review amounted to \$3,122,487 as against \$3,021,629 in the preceding year. The number of employees in 1941 was reported at 1,455 and the amount of salaries and wages distributed totalled \$1,535,609. The footage drilled during 1941 in the entire Dominion aggregated 2,793,420 feet, of which 59 per cent was completed in Ontario, 27 per cent in Quebec and 10 per cent in British Columbia.

The industry as a whole purchased, in 1941, borts, ballas, carbons, readyset and cast bits, etc., valued at \$861,253 compared with \$881,085 in 1940.

Not included in this survey are data relating to the drilling of gas and oil wells and diamond drilling conducted by Canadian mining companies with their own personnel and equipment. Statistics relating to these particular operations are combined with those pertaining to the Canadian mining industry proper. In this regard, it is interesting to note that the use of diamond drills in stoping and other rock breaking operations has increased rapidly during recent years; Noranda Mines Limited reported that in 1941 the use of diamond drills by this Company alone, instead of percussion rock drills, for breaking ore in stopes was increased about 32 per cent over that of the previous year, some 363,800 feet of diamond drilling having been done for that purpose. The use of mechanically set bits has increased greatly and it was reported that various bits consisting of very small diamonds or diamond dust bonded by sintered powdered metal were marketed in 1941. More and smaller stones (25-80 per carat) together with improved alloy bonds are now being used in drilling bits.

United States price administrator, Henderson, declared on May 6, 1942 that industrial diamonds, vital in the war effort because of their widespread use in machine tools, or cutting, sharpening, drilling, and marking, are subject to the general maximum United States price regulation, issued April 28.

Contract Diamond Drilling Operations in Canada, 1940

Province	Footage drilled	Income from drilling	Number of employees	Total salaries and wages paid
		\$		\$
Nova Scotia.....	7,463	15,300	16	7,282
New Brunswick.....				
Quebec.....	772,493	1,085,885	400	428,761
Ontario.....	1,302,848	1,556,927	707	829,341
Manitoba.....	14,189	18,657	15	6,009
Saskatchewan.....	25,473	31,617	10	10,496
Alberta.....				
British Columbia.....	277,793	332,434	185	283,558
Yukon.....				
Northwest Territories.....	22,689	30,809	17	10,339
Canada.....	2,422,948	3,021,629	(a) 1,350	1,575,786

Value of stones, readyset and cast set bits purchased, 1940.....\$ 881,085

(a) Includes part-time employees.

Contract Diamond Drilling Operations in Canada, 1941

Province	Footage drilled	Income from drilling	Number of employees	Total wages paid
		\$		\$
Nova Scotia.....	4,640	8,351	7	4,021
New Brunswick.....				
Quebec.....	759,506	895,169	365	400,870
Ontario.....	1,653,075	1,736,464	866	913,873
Manitoba.....	19,400	23,606	36	9,089
Saskatchewan.....	25,543	24,805	14	8,970
Alberta.....	3,288	3,017	1	458
British Columbia.....	298,273	387,677	144	181,765
Yukon.....				
Northwest Territories.....	29,695	43,698	22	16,563
Canada.....	2,793,420	3,122,487	(a) 1,455	1,535,609

Value of stones, readyset and cast set bits purchased, 1941.....\$ 861,253

(a) Includes part-time employees.

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1940.

Arsenic.—White arsenic (As_2O_3) shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average London price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by the Ontario smelter producing these products added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the gross amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average London price for the year, in Canadian funds; (b) Copper in blister copper made at Manitoba, Ontario and Quebec smelters valued at the average London price for the year in Canadian funds; (c) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

The price per pound used throughout 1940 to evaluate Canadian production was that agreed upon by the Canadian Producers and the British Government.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products is valued at the standard rate of \$20.671834 per fine ounce until the end of 1930. For succeeding years, unless otherwise specified, gold is valued at the average price on world markets transposed to Canadian funds.

Lead.—Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds. The average price used for 1940 was that agreed upon by contract between Canadian producers and the British Government.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued in Canadian funds at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in Canadian funds in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

Platinum Group Metals.—Recoverable metals in smelter products and placer platinum at the average London price and transposed to Canadian funds.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price in Canadian funds for the refined metal.

Tellurium and Selenium.—Smelter production valued at the average London price for the year.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co., Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co., Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London, in Canadian funds.

The average price used for 1940 was that agreed upon by contract between Canadian producers and the British Government.

Coal.—Output tonnage evaluated prorata according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements and quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country, the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression "ton" means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

Unless otherwise arranged, the data relating to the operations of less than three firms producing the same commodity or mineral are not published separately.

DIRECTORY OF FIRMS

In the following pages the names and addresses of all the principal operators in the Canadian mining industry are given and the location of the properties worked in 1940 is also shown.

METAL MINING INDUSTRIES

Alluvial Gold Mining Industry

NOTE.—(x) Active but not producing.

Name	Head office address	Location
QUEBEC—		
Appalachian Mining Synd. (x).....	196 Robinson St., Moncton, N.B.....	Stratford Centre.
Davis, W. A.	Box 282, East Angus.....	Westbury Tp.
Embergold Mines Ltd. (x).....	434 Canada Cement Bldg., Montreal.....	Ditton Tp.
Moe River Gold Mines Ltd. (x).....	R.R. 2, Moe River.....	Compton Tp.
ONTARIO—		
Onwatlin Placer Mining Synd. Ltd. (x).....	513 Metropolitan Bldg., Toronto.....	Capreol Dist.
BRITISH COLUMBIA—		
Acorn Placer Group.....	c/o H. A. McKey, Blewett.....	Nelson M.D.
Anderson, Oliver.....	Fort Steele.....	Fort Steele M.D.
Alice Creek Mines Ltd.....	1010 Hall Bldg., Vancouver.....	Stikine M.D.
Anderson, Maurice A.....	Barkerville.....	Cariboo M.D.
Armstrong, J. K.....	Princeton.....	Tulameen River.
Band K. Placers.....	c/o H. B. King-Wells.....	Cariboo M.D.
Black Jack Cariboo Mines Inc.....	408 American Bldg., Seattle, Wash., U.S.A.....	Cariboo M.D.
Boulder Creek Mines Ltd.....	Hall Bldg., Vancouver.....	Stikine M.D.
Broswick Bros.....	Prince George.....	Cariboo M.D.
Boquist and Co.....	Atlin.....	Atlin M.D.
Brandvold, M.....	Cranbrook.....	Fish Lake.
Bride, Maurice.....	Atlin.....	Spruce Creek.
Browne, John W.....	Atlin.....	Spruce Creek.
Bullion Placers Ltd.....	917 Vancouver Block, Vancouver.....	Quesnel M.D.
Burrard Placers Ltd. (x).....	555 Burrard St., Vancouver.....	Quesnel M.D.
Cariboo Cottonwood Placers Ltd.....	Quesnel.....	Quesnel M.D.
Columbia Development Ltd.....	Atlin.....	Atlin M.D.
Compagnie Française.....	c/o M. B. Moran, Atlin.....	Atlin M.D.
Consolidated Mining & Smelting Co. of Canada Ltd.....	Trail.....	Atlin M.D.
Coreau, James L.....	Cottonwood.....	Fort Steele M.D.
Craig, Munn & Reese.....	808 Vancouver Block, Vancouver.....	Cariboo M.D.
Crowe, R. H.....	Atlin.....	Quesnel M.D.
Campbell, Robt.....	Grand Forks.....	Atlin M.D.
Carnie, Robt.....	Hatzie.....	Grand Forks.
Delprato, J.....	Coalmont.....	Fraser River.
Elder, H. & Co.....	Wingdam.....	Granite Creek.
Erinerdale Placers.....	c/o F. W. Freeman, Van Winkle.....	Cariboo M.D.
Ewen, J. and Oscarson, D.....	Box 53, Cranbrook.....	Cariboo M.D.
Falconer, D. K.....	Atlin.....	Fort Steele M.D.
Fallesen, A.....	Atlin.....	Spruce Creek.
Fleury, T. A. and Chapman, W.....	Wells.....	Spruce Creek.
Foubert, Adeler.....	Atlin.....	Ruby Creek.
French Creek Hydraulic Placers Ltd.....	406 Lancaster Bldg., Calgary.....	Cariboo M.D.
Fry, Thomas.....	Wingdam.....	Cariboo M.D.
Germansen Ventures Ltd.....	Germansen Landing.....	Omineca M.D.
Graham & Hargis Mining Co. (x).....	351 Victoria St., Kamloops.....	Cariboo M.D.
Grisen, F. and Huffman, R.....	Atlin.....	Atlin M.D.
Gunn, J. J.....	Wells.....	Cariboo M.D.
Hall, J.....	11407-87th St., Edmonton, Alta.....	Vernon.
Halverson, Gunnar.....	Barkerville.....	Cariboo M.D.
Husselbec & Smith.....	Atlin.....	Atlin M.D.
Harvey Creek Mines Ltd.....	555 Burrard St., Vancouver.....	Quesnel M.D.
Hasbrouck, W. C.....	Keithley Creek.....	Quesnel M.D.
Hodges & Moran (Wright Creek Hydraulic Co.).....	Atlin.....	Atlin M.D.
Holland, J. and Ross, D.....	Wells.....	Cariboo M.D.
Hougen, O. R.....	Mission City.....	New Westminster.
Hyslop, A. C. and Stewart, A.....	Hixon Creek.....	Cariboo M.D.
Ivanic & Co.....	Atlin.....	Atlin M.D.
Jensen, Peter & Co.....	Likely.....	Quesnel M.D.
Johnson & Co.....	Atlin.....	Atlin M.D.
Johnson, Paul and Bruer, A.....	Lumby.....	Vernon M.D.
Jorgensen, Peter.....	Dease Lake.....	Stikine M.D.
Kelby, Knut.....	Barkerville.....	Cariboo M.D.
Kelby, John.....	Fort Steele.....	Fort Steele M.D.
Ketch Ltd.....	c/o H. B. King, Wells.....	Cariboo M.D.
Kohler, Hans.....	Hudson Hope.....	Peace River M.D.
Knudsen, Martin.....	Fort Steele.....	Fort Steele M.D.
Kruger, W.....	Hudson Hope.....	Peace River M.D.
Kuchan, Geo.....	Horse Fly.....	Quesnel M.D.

DIRECTORY OF FIRMS—Continued

Alluvial Gold Mining Industry—Concluded

NOTE.—(x) Active but not producing.

Name	Head office address	Location
BRITISH COLUMBIA—Concluded		
Klee, John.....	Atlin.....	Atlin M.D.
Landstrom, L. & Co.....	Atlin.....	Atlin M.D.
Logar & Kindrachuck.....	Box 36, Atlin.....	Atlin M.D.
Lungquist, B.....	Valachin.....	
Lost Creek Placer Gold Ltd.....	736 Granville St., Vancouver.....	Omineca M.D.
Lowhee Mining Co. Ltd.....	917 Rust Bldg., Tacoma, Wash.....	Cariboo M.D.
MacPherson, C. A.....	Box 1, Barkerville.....	Cariboo M.D.
Matson & Schultz.....	Atlin.....	Atlin M.D.
McCall, Frank L.....	Cranbrook.....	Cranbrook.
McCrae, Alex & Sons.....	Revelstoke.....	Revelstoke.
Munro, McDonald, McKay.....	Atlin.....	Atlin M.D.
Mellino, Fred.....	Jesmond.....	Fraser River.
Melsted, V. J.....	Rock Creek.....	Greenwood M.D.
Murphy, Nathan.....	Atlin.....	O'Donnell River.
McKinnon, Chas. E.....	Atlin.....	Spruce Creek.
Morrison, A. M.....	Atlin.....	Ruby Creek.
Nelson Placers Ltd.....	347 Baker St., Nelson.....	Blewitt.
Nunn, W. H.....	Lumberton.....	Fort Steele M.D.
Noal, Carlo.....	Atlin.....	Spruce Creek.
Noland, John W.....	Atlin.....	Spruce Creek.
Northern Resources Ltd.....	475 Howe St., Vancouver.....	Atlin M.D.
Ohman, Fred.....	Atlin.....	Spruce Creek.
Olson, Carl.....	Tulameen.....	Yale M.D.
Peebles & MacDougall.....	Wells.....	Cariboo M.D.
Placer Engineers Ltd.....	304 Pacific Bldg., Vancouver.....	Quesnel M.D.
Prpich, Thos.....	Atlin.....	Atlin M.D.
Priority Miners Ltd. (x).....	Williams Lake.....	Quesnel M.D.
Piccolo, J.....	Atlin.....	Atlin M.D.
Rembler Placers Ltd.....	Vernon.....	Vernon M.D.
Risberg, Carl A.....	Van Winkle.....	Cariboo M.D.
Rix, Wm.....	Wingdam.....	
Roman, K.....	Hixon.....	Cariboo M.D.
Rouban, Chas.....	Wells.....	Cariboo M.D.
Sang Dang Placer Mine.....	Barkerville.....	Cariboo M.D.
Slade Placers Ltd.....	Cottonwood.....	Cottonwood.
Spruce Creek Mining Co. Ltd.....	Atlin.....	Atlin M.D.
Stanley Mines Ltd. (x).....	724 Nelson St., Vancouver.....	Cariboo M.D.
Standfast, John P.....	Revelstoke.....	Revelstoke M.D.
Steele, Granville.....	Atlin.....	Atlin M.D.
Swan, John, Sr.....	Cranbrook.....	Fort Steele M.D.
Swanson, Watt & Lindgren.....	Atlin.....	McKee Creek.
Snell, G.....	Wanderhoof.....	Omineca M.D.
Taber Creek Mining Synd.....	Prince George.....	Cariboo M.D.
Tetley, E.....	Atlin.....	Atlin M.D.
Tom Creek Placers Ltd.....	507 Randall Bldg., Vancouver.....	Omineca M.D.
Tripple Hydraulic Placers Ltd.....	c/o H. B. King, Wells.....	Cariboo M.D.
Traho, C. O.....	Atlin.....	Atlin M.D.
Trehouse Hydraulic.....	Barkerville.....	Cariboo M.D.
Thissen, P. and Storey, T.....	Wells.....	Cariboo M.D.
Vancourt Placers.....	Box 392, Courtenay.....	Nanaimo M.D.
Wild Horse Placers (x).....	505 Peyton Bldg., Spokane, Wash., U.S.A.....	Fort Steele M.D.
Williams, James F.....	Van Winkle.....	Cariboo M.D.
Wing, D. L.....	Box 113, Wrangell, Alaska.....	Stikine M.D.
Woodman, E. H.....	Atlin.....	Atlin M.D.
Winser, F.....	Rock Creek.....	Greenwood M.D.
YUKON—		
Canadian Placers Ltd.....	Box 1289, Fairbanks, Alaska.....	Clear Creek.
Haggert Mining Co.....	Mayo.....	Mayo M.D.
Holbrook Dredging Co.....	Dawson.....	Sixtymile.
Middlecoff, E.....	Mayo.....	Hiat Creek.
Stewart & Campbell.....	Glacier Creek.....	Miller Creek.
Taylor, Fred.....	Mayo.....	Dublin Gulch.
Yukon Consolidated Gold Corp. Ltd.....	1919 Marine Bldg., Vancouver.....	various.

Principal Operators in the Canadian Auriferous Quartz Mining Industry

NOVA SCOTIA—		
Cameron, Lee.....	Carleton.....	Carleton.
Consolidated Mining & Smelting Company of Canada Ltd.....	215 St. James St. W., Montreal, Que.....	Halifax Co.
Dickson, Aubrey.....	Box 247, Sydney.....	Guysborough Co.
Guysborough Mines Ltd.....	Goldenville.....	Goldenville.
Horne Gold Mines Ltd.....	50 Sackville St., Halifax.....	Hants Co.
Killag Gold Mines Ltd.....	1010 St. Catherine St. W., Montreal, Que.....	Halifax Co.
Queens Mines Ltd.....	297 Agricola St., Halifax.....	Queens Co.
Rehabilitation Project (15 Mile Stream).....	Nova Scotia Department of Mines, Halifax.....	15 Mile Stream.
Seal Harbour Gold Mines Ltd.....	75 St. Germaine Ave., Toronto, Ont.....	Guysborough Co.

DIRECTORY OF FIRMS—Continued

Principal Operators in the Canadian Auriferous Quartz Mining Industry, 1940—Continued

NOTE.—(x) Active but not producing.

Name	Head office address	Location
QUEBEC—		
Agaura Explorations Ltd. (x)	c/o Royal Trust Co., Montreal	Examinations.
Amm Gold Mines Ltd.	80 King St. W., Toronto, Ont.	Cadillac.
Arntfield Gold Mines Ltd.	Arntfield	Beauchastel Tp.
Arrowhead Gold Mines Ltd. (x)	240 St. James St. W., Montreal	Noranda.
Astoria Quebec Mines Ltd. (x)	70 St. Paul St., Quebec	Rouyn and Louvicourt Tps.
Beattie Gold Mines Ltd.	25 King St. W., Toronto, Ont.	Duparquet Tp.
Belleterre Quebec Mines Ltd.	Belleterre	Guillet Tp.
Canadian Malartic Gold Mines Ltd.	25 King St. W., Toronto, Ont.	Fournier Tp.
Central Cadillac Mines Ltd.	717 Transportation Bldg., Montreal	Cadillac Tp.
Central Mining Corp. (x)	465 St. John St., Montreal	N. W. Quebec.
Centremaque Gold Mines Ltd. (x)	Room 606, 407 McGill St., Montreal	Bourlamaque Tp.
Chibmac Mines Ltd. (x)	132 St. James St. W., Montreal	Beauchastel Tp.
Claveryn Gold Mines Ltd.	1456 Drummond Bldg., Montreal	Claveryn.
Clerno Quebec Mines Ltd. (x)	63 Main St., Hull	Rouyn Tp.
Consolidated Mining & Smelting Company of Canada Ltd. (y)	215 St. James St. W., Montreal	Various.
Cook Gold Mines Ltd. (x)	Belleterre	Guillet Tp.
Cournor Mining Co. Ltd.	215 St. James St. W., Montreal	Louvincourt Tp.
Cromar Development Co. Ltd. (x)	Room 616, Aldred Bldg., Montreal	Gaspé North.
Dome Exploration Co. Ltd. (x)	Bourlamaque	Various.
Dagold Mining Co. Ltd. (x)	Authier Ave., Amos	Dubuisson Tp.
Dumico Gold Corp. (x)	Box 250, Place d'Armes, Montreal	Duparquet Tp.
East Malartic Mines Ltd.	Norrie	Fournière Tp.
Fabreor Ltd. (x)	4125 St. Denis, Montreal	Fabre Tp.
Flobec Gold Mines Ltd. (x)	214 Turner Bldg., Hamilton, Ont.	Guillet Tp.
Francoeur Gold Mines Ltd.	941 Dominion Square Bldg., Montreal	Beauchastel Tp.
Galloway Gordon Lake Mines Ltd. (x)	36 Toronto St., Toronto, Ont.	Dasserat Tp.
Gamma Mines (Que.) Ltd. (x)	Bourlamaque	Bourlamaque Tp.
Golconda Mines Ltd. (x)	276 St. James St. W., Montreal	Duparquet-Destor Tps.
Greater Malartic Gold Mines Ltd. (x)	Malartic	N. W. Quebec.
Guess, H. A. (x)	120 Broadway, New York	Options.
Hollinger (Que.) Exploration Co. Ltd. (x)	Arntfield	Various.
Howey Gold Mines Ltd. (x)	901 Federal Bldg., Toronto, Ont.	Malartic.
Inseo Mines Ltd. (x)	Box 640, Amos	Dufresnoy Tp.
Inspiration Mining & Development Co. Ltd. (x)	Box 640, Amos	Exploration.
International Mining Corp. (Que.) Ltd. (x)	Room 1210, 360 St. James St. W., Montreal	Desjardins Tp.
Joannes Gold Mines Ltd. (x)	New Liskeard, Ont.	Joannes Tp.
Joliet-Quebec Mines Ltd. (x)	Room 205, 260 Bay St., Toronto, Ont.	Rouyn Tp.
Kewagama Gold Mines Ltd.	c/o Beattie Gold Mines Ltd.	Kewagama.
Keyroc (Que.) Gold Mines Ltd. (x)	36 Toronto St., Toronto, Ont.	Rouyn
Kiena Holdings Ltd. (x)	Room 2810, 25 King St. W., Toronto, Ont.	Dubuisson Tp.
La Mine d'Or Provencher Ltd. (x)	Box 698, Rouyn	Beauchastel.
Lacoma Gold Mine (Quebec) Ltd. (x)	Senneterre	Tavernier Tp.
Lake Expanse Gold Mines Ltd. (x)	Room 1207, 67 Yonge St., Toronto, Ont.	Guillet Tp.
Lake Rose (Quebec) Mines Ltd. (x)	Senneterre	Rose Lake.
Lamaque Mining Co. Ltd.	Bourlamaque	Bourlamaque.
Lapa Cadillac Gold Mines Ltd.	275 St. James St. W., Montreal	Cadillac Tp.
Lavalie Mines (Quebec) Ltd. (x)	Room 1107, 67 Yonge St., Toronto, Ont.	Bourlamaque.
Leclerc, J. J. (x)	Drapeau	New Richmond Tp.
Les Mines d'Or Bellehumeur Ltd. (x)	Bearn	Laverlochier Tp.
Lourmet Mines Ltd. (x)	Room 301, 215 St. James St. W., Montreal	Louvincourt Tp.
Madison Gold Mines Ltd. (x)	6401 Louis Hébert Ave., Montreal	Louvincourt Tp.
Malartic Gold Fields Ltd.	355 St. James St. W., Montreal	Dubuisson Tp.
Manitou Mines (Quebec) Ltd. (x)	78 Sparks St., Ottawa, Ont.	Bourlamaque Tp.
McWatters Gold Mines Ltd.	Box 988, Haileybury, Ont.	McWatters.
Megiscane Mining Corp. (x)	726 Insurance Exchange Bldg., Montreal	Barry Tp.
Mic-Mac Mines Ltd. (x)	Box 290, Noranda	Bousquet Tp.
Mooshla Gold Mines Ltd.	275 St. James St. W., Montreal	Bousquet Tp.
National Malartic Gold Mines Ltd. (x)	Room 110, 215 St. James St. W., Montreal	Fournière Tp.
Noralbo Exploration & Mining Co. Ltd. (x)	3825 Marlowe Ave., Montreal	Bousquet Tp.
Norana Gold Mines Ltd. (x)	5830, 5th Ave., Montreal	Hay Tp.
Norgold Mines Ltd. (x)	100 Adelaide St. W., Toronto, Ont.	Bousquet Tp.
Normar Mines Ltd. (x)	McWatters	Bousquet Tp.
Northern Quebec Goldfields & Exploration Co. (x)	Three Rivers	Bousquet Tp.
O'Brien Gold Mines Ltd.	Kewagama	Cadillac Tp.
Orcour Gold Mines Ltd. (x)	Room 503, 357 Bay St., Toronto, Ont.	Louvincourt Tp.
Pandora Cadillac Gold Mines Ltd.	Box 700, New Liskeard, Ont.	Cadillac.
Pantanen Malartic Gold Mines Ltd. (x)	Room 314, 57 Queen St. W., Toronto, Ont.	Malartic Tp.
Pascaline Gold Mines (Que.) Ltd. (x)	c/o Beattie Gold Mines Ltd.	Pascalie Tp.
Pelletier Lake Gold Mines Ltd. (x)	c/o Beattie Gold Mines Ltd.	Rouyn Tp.
Perron Gold Mines Ltd.	Perron	Pascalie Tp.
Pershing Manitou Gold Mines Ltd. (x)	132 St. James St. W., Montreal	N. W. Quebec.
Pontiac Rouyn Mines Ltd. (x)	100 Adelaide St. W., Toronto, Ont.	Rouyn Tp.
Powell Rouyn Gold Mines Ltd.	Box 300, Noranda	Rouyn Tp.
Prospectors & Drillers Ltd. (x)	Room 208, 266 St. James St. W., Montreal	Lounay.
Quebec Smelting & Refining Corp. (x)	Room 301, 215 St. James St. W., Montreal	Dalquière Tp.
Radisson Gold Mines Ltd. (x)	941 Dominion Square Bldg., Montreal	Arntfield.
Regent Gold Syndicate Ltd. (x)	Box 159, Rouyn	Rouyn Tp.
Renault, August (x)	Kanasuta	Dasserat Tp.
Robinson, H. S. (x)	15 King St. W., Toronto, Ont.	N. W. Quebec.

DIRECTORY OF FIRMS—Continued

Principal Operators in the Canadian Auriferous Quartz Mining Industry, 1940—Continued

NOTE.—(x) Active but not producing.

Name	Head office address	Location
QUEBEC—Concluded		
Rochette Gold Mines Co. Ltd. (x)	132 St. James St. W., Montreal	Launay Tp.
Rouleau Mines Ltd. (x)	726 Insurance Exchange Bldg., Montreal	Barry Tp.
Scott Chibougamau Mines Ltd. (x)	215 St. James St. W., Montreal	Scott Tp.
Senator-Rouyn Ltd.	187 Main St., Hull	Rouyn Tp.
Senore Gold Mines Ltd. (x)	Perron	Senneville Tp.
Shawmaque Gold Mines Ltd. (x)	660 St. Catherine St. W., Montreal	Dubuisson Tp.
Sigma Mines (Quebec) Ltd.	Bourlamaque	Bourlamaque Tp.
Siscoe Gold Mines Ltd.	907 Dominion Square Bldg., Montreal	Varsen Tp.
Sladen-Malartic Mines Ltd.	319 Ottawa Electric Bldg., Ottawa, Ont.	Fournier Tp.
Stadacona Rouyn Mines Ltd.	Rouyn	Rouyn Tp.
Sudbury Contact Mines Ltd.	100 Adelaide St. W., Toronto, Ont.	Bousquet Tp.
Sullivan Consolidated Mines Ltd.	1604 Aldred Bldg., Montreal	Dubuisson Tp.
Teck Exploration Co. (x)	25 King St. W., Toronto, Ont.	N. W. Quebec.
Trivincour Gold Mines Ltd. (x)	4516 St. Catherine St. W., Montreal	Louvicoourt Tp.
Valco Mines Co. (x)	65 St. Peter St., Quebec	Cadillac
Val d'Or Extension (x)	Box 913, Val d'Or	Bourlamaque Tp.
Val d'Oro Mines Ltd. (x)	Box 913, Val d'Or	Louvicoourt Tp.
Varsan Gold Mines Ltd. (x)	Amos	Varsan Tp.
Vicour Gold Mines Ltd. (x)	Box 225, Val d'Or	Louvicoourt Tp.
Viritia Porcupine Gold Mines Ltd. (x)	1706 Royal Bank Bldg., Toronto, Ont.	Rouyn Tp.
West Malartic Mines Ltd. (x)	6998 Jeanne Mance St., Montreal	Cadillac Tp.
Westwood Cadillac Mines Ltd. (x)	14 Ninth St., Noranda	Bousquet Tp.
Wood Cadillac Mines Ltd.	437 St. James St. W., Montreal	Cadillac Tp.
ONTARIO—		
<i>Porcupine Area—</i>		
Aquarius Porcupine Gold Mines Ltd. (x)	Room 706, 100 Adelaide St. W., Toronto	German and MacKlem Tps.
Aunor Gold Mines Ltd.	1600 Royal Bank Bldg., Toronto	Deloro Tp.
Broulan Porcupine Mines Ltd.	1705 Sterling Tower Bldg., Toronto	Pamour.
Buffalo Ankerite Gold Mines Ltd.	Box 533, South Porcupine	S. Porcupine.
Coniaurum Mines Ltd.	25 King St. W., Toronto	Schumacher.
Delnau Gold Mines Ltd. (x)	1502 Sterling Tower Bldg., Toronto	Deloro Tp.
Delnite Mines Ltd.	Box 590, Timmins	Deloro Tp.
De Santia Porcupine Mines Ltd.	424 Second Ave., Timmins	Ogden Tp.
Devon Gold Mines Ltd.	1809 Royal Bank Bldg., Toronto	Matheson.
Dome Mines Ltd.	South Porcupine	S. Porcupine.
Electra Porcupine Gold Mines Ltd. (x)	100 Adelaide St. W., Toronto	German and MacKlem Tps.
Faymar Porcupine Gold Mines Ltd.	Room 208, 200 Bay St., Toronto	Deloro Tp.
Hallnor Mines Ltd.	1600 Royal Bank Bldg., Toronto 2	Whitney Tp.
Hollinger Consolidated Gold Mines Ltd.	Timmins	Timmins and Hislop Tps.
Hoyle Gold Mines Ltd. (x)	25 King St. W., Toronto	Whitney Tp.
Kelrowe Gold Mines Ltd. (x)	Room 208, 200 Bay St., Toronto	Hislop Tp.
Lowell Porcupine Gold Mines Ltd. (x)	14 King St. E., Toronto	Ogden Tp.
Mace Gold Mines Ltd. (x)	80 King St. W., Toronto	Schumacher.
McIntyre Porcupine Mines Ltd.	Schumacher.	Schumacher.
Moneta Porcupine Mines Ltd.	67 Yonge St., Toronto	Tisdale Tp.
Nakhodas Mining Co. Ltd.	Room 208, 200 Bay St., Toronto	Tisdale Tp.
Naybob Gold Mines Ltd.	711 Federal Bldg., Toronto	Ogden and Deloro Tps.
Nipissing Mining Co. Ltd. (x)	Cobalt	Ogden Tp.
North Whitney Mines Ltd. (x)	Room 403, 100 Adelaide St. W., Toronto	Pamour.
Pamour Porcupine Mines Ltd.	Pamour.	Pamour.
Paymaster Consolidated Mines Ltd.	Box 508, South Porcupine	Deloro and Tisdale Tps.
Porcupine Lake Gold Mining Co. Ltd.	112 Yonge St., Toronto	Whitney Tp.
Preston East Dome Mines Ltd.	Room 207, 200 Bay St., Toronto	S. Porcupine.
Skyner Lake Gold Mines Ltd. (x)	413 C.P.R. Bldg., Toronto	Deloro Tp.
White-Guyatt Mining Co. Ltd. (x)	c/o Wright Hargreaves Mines Ltd., Kirkland Lake	Matheson.
<i>Kirkland Lake Area—</i>		
Bigdood Kirkland Gold Mines Ltd.	Room 504, 357 Bay St., Toronto	Lebel Tp.
Brook Gold Mines Ltd. (x)	1101 Federal Bldg., Toronto	Gauthier Tp.
Federal Kirkland Mining Co. Ltd. (x)	Federal Bldg., Toronto	Teck Tp.
Golden Gats Mining Co. Ltd.	Room 304, 19 Melinda St., Toronto	Swastika.
Hughmer Gold Mines Ltd. (x)	371 Bay St., Toronto	Skeud Tp.
Kirkland-Hudson Bay Gold Mines Ltd. (x)	New Liskeard	Teck Tp.
Kirkland Lake Gold Mining Co. Ltd.	1314 Metropolitan Bldg., Toronto	Teck Tp.
Kirkland Gold Rand Ltd. (x)	1812 Royal Bank Bldg., Montreal, Que.	Kirkland Lake.
Lake Shore Mines Ltd.	Kirkland Lake	Teck Tp.
Macassa Mines Ltd.	1001 Federal Bldg., Toronto	Kirkland Lake.
Morris Kirkland Gold Mines Ltd.	156 Yonge St., Toronto	Lebel Tp.
Norland Mines Ltd. (x)	80 King St. W., Toronto	Gauthier Tp.
Sylvanite Gold Mines Ltd.	Box 670, Kirkland Lake	Teck Tp.
Teck-Hughes Gold Mines Ltd.	25 King St. W., Toronto	Teck Tp.
Toburn Gold Mines Ltd.	1809 Royal Bank Bldg., Toronto	Teck and Lebel Tps.
Upper Canada Mines Ltd.	1101 Federal Bldg., Toronto	Gauthier Tp.
Wright-Hargreaves Mines Ltd.	Kirkland Lake	Kirkland Lake.
<i>Larder Lake Area—</i>		
Anoki Gold Mines Ltd. (x)	1006 Concourse Bldg., Toronto	Gauthier Tp.
Chesterville Larder Lake Gold Mining Co. Ltd.	Room 404, 330 Bay St., Toronto	McGarry Tp.
Kerr-Addison Gold Mines Ltd.	80 King St. W., Toronto	McGarry Tp.
Laguerre Gold Mines Ltd. (x)	80 King St. W., Toronto	Larder Lake.

DIRECTORY OF FIRMS—Continued

Principal Operators in the Canadian Auriferous Quartz Mining Industry, 1940—Continued

NOTE.—(x) Active but not producing.

Name	Head office address	Location
ONTARIO—Continued		
<i>Larder Lake Area—Concluded</i>		
Omega Gold Mines Ltd.	15 King St. W., Toronto.	McVittie Tp.
Sanymac Mining & Development Co. Ltd. (x)	Room 512, 19 Melinda St., Toronto.	Katrine Tp.
Yama Gold Mines Ltd. (x)	Room 1004, 80 Richmond St. W., Toronto.	McElroy Tp.
<i>Matachewan Area—</i>		
Arbode Gold Mines Ltd. (x)	Room 2, 422 Richmond St., London.	Argyle and Baden Tps.
Hollinger Consolidated Gold Mines Ltd. (Young-Davidson)	Timmins.	Powell Tp.
Matachewan Consolidated Mines Ltd.	25 King St. W., Toronto.	Powell Tp.
<i>Sudbury Area—</i>		
Consolidated Mining & Smelting Co. of Canada Ltd. (Golden Rose)	215 St. James St. W., Montreal.	Afton Tp.
Jerome Gold Mines Ltd. (x)	Room 602, 390 Bay St., Toronto.	Osway Tp.
Roche Long Lac Gold Mines Ltd. (x)	Room 1404, 80 Richmond St. W., Toronto.	Various.
Tyrantite Mines Ltd.	Tyrantite.	Tyrrell and Knight Tps.
<i>Algoma Area—</i>		
Amherst Gold Mines Ltd.	907 Central Bldg., Toronto.	Goudreau.
Cline Lake Gold Mines Ltd.	Lochalsh.	Algoma Dist.
Deep Lake Gold Mines Ltd. (x)	109 North Union St., Akron, Ohio, U.S.A.	Wawa.
Minto Gold Mines Ltd. (x)	c/o J. Knox, Arnfield, Que.	Gowganda.
Parkhill Gold Mines Ltd.	Wawa.	Wawa.
Ransom Mines Ltd. (x)	Royal Bank Bldg., Sault Ste. Marie.	Michipicoten River.
Regenery Metals (Alden-Goudreau)	c/o W. Regenery, Hawk Junction.	Mile 171 A.C. and H.R.R.R.
<i>Thunder Bay Area—</i>		
Bandolac Mining Co. Ltd. (x)	La Belle Bldg., Windsor.	Shebandowan.
Bankfield Cons. Mines Ltd.	1006 Concourse Bldg., Toronto.	Errington Tp.
Halport Mines Ltd. (x)	Room 1207, 67 Yonge St., Toronto.	Eva and Summers Tps.
Hard Rock Gold Mines Ltd.	Geraldton.	Ashmore Tp.
Hutchison Lake Gold Mines Ltd. (x)	Room 226, 200 Bay St., Toronto.	Fulford Tp.
Jellicoe Mines Ltd.	Room 3100, 25 King St. W., Toronto.	Geraldton.
Leitch Gold Mines Ltd.	Beardmore.	Eva and Summers Tps.
Little Long Lac Gold Mines Ltd.	1300, 25 King St. W., Toronto.	Geraldton, d
MacLeod-Cockshutt Gold Mines Ltd.	320 Bay St., Toronto.	Little Long Lac.
Magnet Cons. Mines Ltd.	Empire.	Geraldton.
Northern Empire Mines Co. Ltd.	Empire.	Empire.
Richgreen Gold Mines Ltd. (x)	36 Toronto St., Toronto.	Beardmore.
St. Anthony Gold Mines Ltd.	159 Bay St., Toronto.	Savant Lake.
Sand River Gold Mining Co. Ltd.	302 Bay St., Toronto.	Beardmore.
Sturgeon River Gold Mines Ltd.	Jellicoe.	Irwin and Pipher Tps.
Tombill Gold Mines Ltd.	Empire.	Geraldton.
<i>Kenora-Rainy River Area—</i>		
Kenora Mining & Milling Co. Ltd.	Box 910, Kenora.	Ewart Tp.
Kenricia Gold Mines Ltd.	25 King St. W., Toronto.	Kenora.
La-Re Exploration Co.	Box 910, Kenora.	Haycock Tp.
Nilson, A.	545, 2nd Ave. S., Kenora.	Kenora Dist.
Pickard, Roy.	Kenora.	Kenora.
Rebair Gold Mines Ltd. (x)	9 Adelaide St. E., Toronto.	Atikokan.
Seville-Ferrier Sydn. Ltd. (x)	403 Kent Bldg., Toronto.	Tp. 82.
Straw Lake Beach Gold Mines Ltd.	36 Toronto St., Toronto.	Straw Lake.
Upper Seine Gold Mines Ltd.	702 Kent Bldg., Toronto.	Atikokan.
Wendigo Gold Mines Ltd.	Box 990, Kenora.	Kenora.
Williams, M. C.	Fort Erie N.	Savant Lake.
<i>Patricia District—</i>		
Albino Gold Mines Ltd. (x)	Room 704, 357 Bay St., Toronto.	Various.
Albany River Gold Mines Ltd. (x)	930 Bank of Commerce Bldg., Toronto.	Pickle Crow.
Berens River Mines Ltd.	14 Wall St., New York, N.Y., U.S.A.	Favourable Lake.
Birch Bay Gold Mines Ltd. (x)	603 Royal Bank Bldg., Toronto.	Various.
Central Patricia Gold Mines Ltd.	Central Patricia.	Central Patricia.
Coalton Gold Mining Synd. Ltd. (x)	56 Givens St., Toronto.	Honeywell Tp.
Cochenour Willans Gold Mines Ltd.	801 Dominion Bank Bldg., Toronto.	Red Lake.
Gold Eagle Gold Mines Ltd.	802 Federal Bldg., Toronto.	McKenzie Island.
Gold Frontier Mines Ltd. (x)	244 Bay St., Toronto.	Todd Tp.
Hanada Gold Mines Ltd. (x)	25 King St. W., Toronto.	Uchi Gold Mine.
Hasaga Gold Mines Ltd.	Room 930, 25 King St. W., Toronto.	Red Lake.
Howey Gold Mines Ltd.	901 Federal Bldg., Toronto.	Red Lake.
J. M. Consolidated Mines Ltd.	1116 Federal Bldg., Toronto.	Patricia Dist.
Jalda Gold Mines Ltd. (x)	25 King St. W., Toronto.	Uchi Gold Mine.
Jason Mines Ltd.	67 Yonge St., Toronto.	Casummit Lake.
Madsen Red Lake Gold Mines Ltd.	67 Yonge St., Toronto.	Baird and Heyson Tps.
McKenzie Red Lake Gold Mines Ltd.	19 Richmond St. W., Toronto.	McKenzie Island.
McMarmac Red Lake Gold Mines Ltd.	402 Premier Trust Bldg., Toronto.	Dome Tp.
McDonough Mining Synd. Ltd. (x)	67 Yonge St., Toronto.	Various.
Pickle Crow Gold Mines Ltd.	Pickle Crow.	Pickle Crow.
Sachigo River Exploration Co. Ltd.	25 King St. W., Toronto.	Sachigo River.

DIRECTORY OF FIRMS—Continued

Principal Operators in the Canadian Auriferous Quartz Mining Industry, 1940—Continued

NOTE.—(x) Active but not producing.

Name	Head office address	Location
ONTARIO—Concluded		
<i>Patricia District—Concluded</i>		
Uchi Gold Mines Ltd.	25 King St. W., Toronto	Uchi Lake.
Walker Patricia Gold Mines Ltd. (x)	1608 Star Bldg., Toronto	Pickle Lake.
Woco Gold Developments Ltd. (x)	Room 1504, 80 Richmond St. W., Toronto	Uchi Lake.
<i>Eastern Ontario—</i>		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St. W., Montreal, Que.	Cordova Mines.
Mayboro Milling Co. Ltd.	Box 817, Peterboro.	Madoc Tp.
MANITOBA—		
Beresford Lake Mines Ltd.	1 Somerset Bldg., Winnipeg.	Beresford Lake.
God's Lake Gold Mines Ltd.	395 Main St., Winnipeg.	God's Lake.
Golden West Mines Ltd. (x)	Box 246, Station "B", Montreal, Que.	Elbow Lake.
Gunnar Gold Mines Ltd.	80 King St. W., Toronto, Ont.	Beresford Lake.
San Antonio Gold Mines Ltd.	237 Curry Bldg., Winnipeg.	Rice Lake.
Sunbeam Kirkland Gold Mines, Ltd.	67 Yonge St., Toronto, Ont.	W. Hawk Lake.
SASKATCHEWAN—		
Consolidated Mining & Smelting Company of Canada, Ltd.	Trail, B.C.	Lake Athabaska.
Pamom Gold Mines Ltd. (MacDonald & Co.)	Box 779, Flin Flon, Man.	Beaver Lake.
YUKON—		
Richards, T. C.	Whitehorse.	Mt. Free Gold.
NORTHWEST TERRITORIES—		
Par-Bet Mining Development Co. Ltd.	Yellowknife.	Wray Lake.
Capmac Gold Mining Synd. Ltd. (x)	36 Toronto St., Toronto, Ont.	Yellowknife Dist.
Consolidated Mining & Smelting Company of Canada Ltd.	Trail, B.C.	Yellowknife Dist.
Conwest Exploration Co. Ltd. (x)	1001, 85 Richmond St. W., Toronto.	Prospecting.
Giant Yellowknife Gold Mines Ltd.	80 King St. W., Toronto, Ont.	Yellowknife Dist.
Gypsy Yellowknife Synd. (x)	1207, 67 Yonge St., Toronto, Ont.	Prospecting.
Negus Mines Ltd.	410 Royal Bank Bldg., Toronto, Ont.	Yellowknife Dist.
Mercury Gold Mines Ltd. (x)	3100, 25 King St. W., Toronto, Ont.	Wray Lake Dist.
Ptarmigan Mines Ltd. (x)	Trail, B.C.	Yellowknife Dist.
Ryeon Mines Ltd.	Trail, B.C.	Yellowknife Dist.
Slave Lake Gold Mines Ltd. (x)	Star Bldg., Toronto, Ont.	Outpost Island.
Thompson-Lundmark Gold Mines Ltd. (x)	Trail, B.C.	Thompson Lake.
Tundra Yellowknife Mining Synd. Ltd. (x)	605 Central Bldg., Toronto, Ont.	Yellowknife Dist.
BRITISH COLUMBIA—		
Amandy Mine	Grand Forks.	Greenwood M.D.
Anderson, F. A.	Kimberley.	Port Steele M.D.
Alpine Gold Ltd.	Box 191, Nelson.	Nelson M.D.
Babine Gold Mines Ltd.	744 Hastings St., Vancouver.	Omineca M.D.
Bayonne Cons. Mines Ltd.	308 Pacific Bldg., Vancouver.	Nelson M.D.
Berglund, S.	Westbridge.	Greenwood M.
Big Four Lessors	Ymir (c/o Leo Madden).	Nelson M.D.
Birtsch, Godfrey	Nelson.	Nelson M.D.
Bralorne Mines Ltd.	555 Burrard St., Vancouver.	Lillooet M.D.
Brownson, Harold	Box 570, Port Alberni.	Alberni Dist.
Brunner, Herman	Greenwood.	Greenwood M.D.
Buccaneer Mines Ltd. (x)	555 Burrard St., Vancouver.	Clayoquot M.
Bristol Mines Ltd. (x)	425 Howe St., Vancouver.	Lillooet M.D.
British Gold Mining Synd. (x)	707 Bank of Toronto Bldg., Victoria.	New Westminster M.D.
Buena Vista Mining Co. Ltd.	Trail.	Portland Canal M.D.
Canadian Belle Mining Co.	505 Peyton Bldg., Spokane, Wash., U.S.A.	Nelson M.D.
Canadian Exploration Ltd.	Royal Bank Bldg., Vancouver.	Nanaimo M.D.
Cariboo Gold Quartz Mining Co. Ltd.	1007 Royal Bank Bldg., Vancouver.	Cariboo M.D.
Cariboo Ledge Mining Co. Ltd. (x)	800 Hall Bldg., Vancouver.	Cariboo M.D.
Carlson, A. (Bear)	Nelson.	Nelson M.D.
Carlson, Ole (Morning Star)	Oliver.	Osoyoos M.D.
Central Zeballos Gold Mines Ltd.	215-543 Granville St., Vancouver.	Clayoquot M.D.
Consolidated Mining & Smelting Company of Canada Ltd. (Red Rose) (x)	Trail.	Omineca M.D.
Consolidated Nicola Goldfields Ltd.	506 Dunsmuir St., Vancouver.	Nicola Dist.
Crown Gold Mining Synd.	310 Union Bldg., Victoria.	Nanaimo M.D.
Dawson Cons. Mines Ltd.	716 Hall Bldg., Vancouver.	New Westminster.
Erickson, Axel (Gold Bar)	Terrace.	Portland Canal M.D.
Ethiopia Synd.	c/o Jas Walker, Greenwood.	Greenwood M.D.
Fisher, N. H. (Golden King)	Box 298, Nelson.	Hall Creek.
Fuselier Mines Ltd. (x)	808 W. Pender St., Vancouver.	Clayoquot M.D.
Gachain, J. P.	Carmi.	Carmi.
Gem Gold Mines Ltd. (x)	1604 Royal Bank Bldg., Vancouver.	Nanaimo M.D.
Gold Belt Mining Co. Ltd.	616 Stock Exchange Bldg., Vancouver.	Nelson M.D.
Gold River Mines Ltd. (x)	522 Rogers Bldg., Vancouver.	Clayoquot M.D.
Gormley, G. T. (Catherine lease)	Nelson.	Nelson M.D.
Grange Cons. Mines Ltd. (x)	1351 Broadway West, Vancouver.	Clinton M.D.
Grasshopper Mine Ltd.	475 Howe St., Vancouver.	Similkameen M.D.
Haywood, Harold D. (Red Cliffe)	4765 Drummond Drive, Vancouver.	Portland Canal M.D.

DIRECTORY OF FIRMS—Continued

Principal Operators in the Canadian Auriferous Quartz Mining Industry, 1940—Concluded

NOTE.—(x) Active but not producing.

Name	Head office address	Location
BRITISH COLUMBIA—Concluded		
Hecla Mining Co. (Union).....	c/o W. E. McArthur, Greenwood	Similkameen M.D.
Hedley Mascot Gold Mines Ltd.....	908 Royal Bank Bldg., Vancouver	Osoyoos M.D.
Holm, Harold (Phoenix).....	Box 245, Rossland	Trail Creek M.D.
Highland-Bell Ltd.....	Box 280, Creston	Greenwood M.D.
Homeward Mines Ltd. (x).....	703 Royal Trust Bldg., Vancouver	Zeballos
Island Mountain Mines Co. Ltd.....	Wells	Cariboo M.D.
I. X. L. Leasing Synd.....	Box 122, Rossland	Trail M.D.
International Metals Development (x).....	703 Royal Trust Bldg., Vancouver	Skeena M.D.
Kelowna Exploration Co. Ltd.....	Hedley	Osoyoos M.D.
Kerr, James.....	Carmi	Greenwood M.D.
King Mineral Claim.....	c/o J. P. Wukelick, Box 682, Penticton	Osoyoos M.D.
Kootenay Belle Gold Mines Ltd.....	916 Stock Exchange Bldg., Vancouver	Nelson M.D.
Laib, R. M. and K. K.....	Bayonne	Nelson M.D.
Larsen, E. (Goldfinch-Crescent).....	Greenwood	Greenwood M.D.
Lee, Robt. (Helen).....	Greenwood	Greenwood M.D.
Letain, Felix (Maple Leaf).....	Tofino	Greenwood M.D.
Liberty Lorne Gold Mines Ltd. (x).....	424 Second St., Nelson	Clayoquot M.D.
Little, A. E. (King Midas).....	Zeballos	Nelson M.D.
Livingstone Mining Co. Ltd.....	Blewett	Clayoquot M.D.
Logan, John (Fern).....	Box 298, Nelson	Nelson M.D.
Lucky Strike Gold Mining Co. Ltd. (x).....	Room 814, 850 W. Hastings St., Vancouver	Nelson M.D.
Madden, Leo (Fern).....	Ymir	Lillooet M.D.
Mathew, Ed. (Jessie).....	Box 10, Nelson	Nelson M.D.
McArthur, W. E.....	Box 629, Greenwood	Nelson M.D.
McCorkell, R. C.....	701 Royal Trust Bldg., Vancouver	Greenwood M.D.
McTavish, P. D. (x).....	3890 Olser Ave., Vancouver	Vancouver M.D.
Menhinick, Cory.....	Camborne	Nelson M.D.
Mount, L. A. (Star).....	1590 W. 15th Ave., Vancouver	Lardeau M.D.
Mount Zeballos Gold Mines Ltd.....	514 Royal Bank Bldg., Vancouver	New Westminster M.D.
Musketerees Mines Ltd. (x).....	607 Rogers Bldg., Vancouver	Clayoquot M.D.
Nicholson Creek Mining Corp. (x).....	Insurance Bldg., Seattle, Wash., U.S.A.	Clayoquot M.D.
Noble Bear River Synd. (x).....	Abbotsford Hotel, Vancouver	Omineca M.D.
Noble Five Mines Ltd.....	490 Baker St., Nelson	Clayoquot M.D.
O'K. Leasing Co. (x).....	Box 522, Rossland	Nelson M.D.
Oscarson, Roger O.....	Erie	Trail Creek M.D.
Osoyoos Mines of Canada Ltd.....	Bank of Toronto Bldg., Calgary, Alta.	Nelson M.D.
Parker, Howard M. (Exchange).....	Trail	Osoyoos M.D.
Parkton Gold Mines Ltd. (x).....	416 Vancouver Block, Vancouver	Slocan M.D.
Pedersen, E. B. (Bell No. 2).....	Salmo	Clayoquot M.D.
Pickering, B. A. (Golden Eagle).....	Box 216, Nelson	Slocan M.D.
Penney, S. M. (Kalamalka).....	Box 98, Vernon	Nelson M.D.
Pioneer Gold Mines of B.C. Ltd. (a).....	607 Rogers Bldg., Vancouver	Vernon M.D.
Pitre, R. A. (x).....	604 Bank of Toronto Bldg., Victoria	Lillooet M.D.
Polaris-Taku Mining Co. Ltd.....	807 Lonsdale Bldg., Duluth, Minn., U.S.A.	Nanaimo Lakes.
Prident Gold Mines Ltd. (x).....	602 Stock Exchange Bldg., Vancouver	Atlin M.D.
Privateer Mine Ltd.....	475 Howe St., Vancouver	Zeballos
Prosperine Gold Mines Ltd. (x).....	544 Howe St., Vancouver	Clayoquot M.D.
Providence Mine Synd.....	Box 629, Greenwood	Cariboo M.D.
Relief Arlington Mines Ltd.....	626 W. Pender St., Vancouver	Greenwood M.D.
Reno Gold Mines Ltd. (Reno).....	216 Yorkshire Bldg., Vancouver	Nelson M.D.
(Central Zeballos).....		Nelson M.D.
Robinson, Kenneth J. (W.W.W.).....	602 W. Hastings St., Vancouver	Clayoquot M.D.
Roohfort, J. D. (Dunwell).....	Stewart	Alberni M.D.
Schwarz, W. L. and Kleman Bros.....	Grand Forks	Portland Canal M.D.
Sheep Creek Gold Mines Ltd.....	616 Stock Exchange Bldg., Vancouver	Greenwood M.D.
Sherdahl, C. (Mogue).....	Box 563, Greenwood	Nelson M.D.
Stewart Canal Gold Mines Ltd.....	Stewart	Greenwood M.D.
Silbak Premier Mines Ltd.....	Royal Trust Bldg., Vancouver	Portland Canal M.D.
Smith, Lloyd R. (Mayflower) (x).....	Box 651, Penticton	Portland Canal M.D.
Spud Valley Gold Mines Ltd.....	703 Royal Trust Bldg., Vancouver	Rosland.
Sterrett, Douglas B. (Iron Cap).....	Kamloops	Zeballos
Tate, F. F. (California).....	2080 Santa Clara Ave., Alameda, Cal., U.S.A.	Kamloops M.D.
Taylor, R. R.....	1598 Marpole Ave., Vancouver	Nelson M.D.
United Prospectors Ltd.....	604, 1405 Douglas St., Victoria	Lillooet M.D.
Venango Gold Mines Ltd.....	Box 296, Nelson	Alberni M.D.
Venus-Juno Mine.....	406 First St., Nelson	Blewett
Watson, H. (Ymir Rockland).....	Ymir	Nelson M.D.
Wesko Mines Ltd.....	640 Pender St. W., Vancouver	Nelson M.D.
Whitehead, Geo. (Midway).....	Marjie	Nelson M.D.
White Star Mine Ltd.....	811 Rogers Bldg., Vancouver	Fort Steele M.D.
Windpass Gold Mining Co. Ltd.....	608 Pacific Bldg., Vancouver	Zeballos
Winslow Syndicate.....	c/o A. F. Cumming, Penticton	Boulder
Wukelick, J. P. (Grandoro).....	Box 682, Penticton	Lardeau M.D.
Ymir Commodore Mines Co.....	2109 W. 4th St., Spokane, Wash., U.S.A.	Osoyoos M.D.
Ymir Yankee Girl Gold Mines Ltd.....	508 Yorkshire Bldg., Vancouver	Nelson M.D.
Zeballos (Pacific) Gold Mines Ltd. (x).....	716 Stock Exchange Bldg., Vancouver	Nelson M.D.
Zeballos On Boy Gold Mines Ltd. (x).....	603 Central Bldg., Victoria	Clayoquot M.D.

(a) Also shipped antimony ore from Stuart Lake.

NOTE.—In addition to operators listed, there were numerous small British Columbia shippers to Trail and Tacoma smelters.

DIRECTORY OF FIRMS—Continued

Operators in Canadian Copper-Gold-Silver Mining Industry

NOTE.—(x) Active but not producing.

Name	Head office address	Location
QUÉBEC—		
Aldermac Copper Corporation Ltd.....	941 Dominion Square Bldg., Montreal.....	Beauchastel Tp.
Chapman, J. E. (x).....	Box 439, Hawkesbury, Ont.....	Cheneville.
Cook-Copper Fluorite Corp. (x).....	Box 39, Bartonville, Ont.....	Montbillard Tp.
Gervais, D.....	Box 263, Rouyn.....	Beauchastel Tp.
Lake Dufault Mines Ltd. (x).....	Duparquet.....	Dufresnoy Tp.
Macdonald Mines Ltd. (x).....	132 St. James St. W., Montreal.....	Dufresnoy Tp.
Noranda Exploration Co. Ltd. (x).....	Noranda.....	Holland Tp. (Gaspé).
Noranda Mines Ltd.....	1600 Royal Bank Bldg., Toronto, Ont.....	Rouyn Tp.
Normetal Mining Corp. Ltd.....	Suite 602, 350 Bay St., Toronto, Ont.....	Desmeloizes Tp.
Obalski Mining Corp. (x).....	438 Canada Cement Bldg., Montreal.....	Chibougeau Dist.
Touton Mining & Exploration Co. (x).....	500 Place d'Armes, Montreal.....	Fabre Tp.
Waite Amulet Mines Ltd.....	Noranda.....	Dufresnoy Tp.
		Duprat Tp.
MANITOBA—		
Hudson Bay Mining & Smelting Co. Ltd....	14 Finkle St., Woodstock, Ont.....	Flin Flon.
Sheritt Gordon Mines Ltd.....	25 King St. W., Toronto, Ont.....	Sherridon.
BRITISH COLUMBIA—		
Britannia Mining & Smelting Ltd.....	Britannia Beach.....	Britannia Beach.
Consolidated Mining & Smelting Company of Canada Ltd.....	Trail.....	Rossland.
Conwest Exploration Co. Ltd.....	514 Royal Bank Bldg., Vancouver.....	Omineca M.D.
Granby Cons. Mining, Smelting & Power Co. Ltd.....	Royal Bank Bldg., Vancouver.....	Copper Mountain.
Greenwood Ore Concentrating Co. Ltd.....	Box 529, Greenwood.....	Customs mill, Greenwood.
Highland Basin Gold Mine Ltd.....	507 Stock Exchange Bldg., Vancouver.....	Omineca M.D.
McTavish, P. D. (x).....	3890 Osler Ave., Vancouver.....	Pender Harbour.
McArthur, W. E.....	Box 629, Greenwood.....	Greenwood M.D.
Surf Inlet Cons. Gold Mines Ltd.....	717 Pacific Bldg., Vancouver.....	Skeena M.D.
Velvet Leasing Synd.....	Rossland.....	Rossland.

Beryl

*Canadian Beryllium Mines & Alloys, Ltd....	901 Royal Bank Bldg., Toronto, Ont.....	Quadeville, Ont.
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*Active but not producing.

Chrome Ore Mining Industry

QUÉBEC—		
Asbestos Corporation, Ltd.....	Canada Cement Bldg., Montreal.....	Thetford Mines.
Product—Chromite.....		
*Chromite Ltd.....	404 Notre Dame St. W., Montreal.....	Cleveland Tp.
Product—Chromite.....		
Fletcher, H. P.....	Bank St., Sherbrooke.....	Orford Tp.
Product—Chromite.....		
Metulier, W. R.....	Notre Dame St., Thetford Mines.....	Eastern Tps.
Product—Chromite.....		
*Reed Realities Ltd.....	4808 Grosvenor Ave., Montreal.....	South Ham Tp.
Product—Chromite—antimony.....		
*Thetford Ferro-chrome.....	Thetford Mines.....	Coleraine Tp.
Product—Chromite.....		
ONTARIO—		
*Chromium Mining & Smelting Corp.....	Bank of Commerce Bldg., Hamilton.....	Sault Ste. Marie.
Product—Ferrocchrome.....		

*Active but not producing.

Iron Ore

ONTARIO—		
Algoma Ore Properties Ltd.....	Sault Ste. Marie.....	Michipicoten.
*Steep Rock Iron Mines Ltd.....	25 King St. W., Toronto.....	Atikokan.

*Active but not producing.

DIRECTORY OF FIRMS—Continued

Manganese Mining Industry

Name	Head office address	Location
NOVA SCOTIA—		
Atlantic Manganese Corp. Ltd.....	Box 6, Truro.....	New Ross.
Product—Manganese ore.		
*Munro & MacLennan.....	Bank of Nova Scotia Bldg., Truro.....	East Mountain.
Product—Manganese ore.		
NEW BRUNSWICK—		
*Fenton, I. G. O.....	60 Queen St., St. John.....	Turtle Creek.
Product—Manganese ore.		
*Sussex Manganese Mining Co. Ltd.....	Room 15, 24 King St. W., Toronto.....	Sussex.
Product—Manganese ore.		
QUEBEC—		
Magdalen Manganese Mines Ltd.....	1103 Central Bldg., Toronto.....	Cap aux Meule, M.I.
Product—Manganese ore.		

*Active but not producing.

Molybdenite Mining Industry

QUEBEC—		
*Cheabella Mine Co.....	413 Aylmer Rd., Hull.....	Montebeillard Tp.
*La Pauze Gold Mining Corp. Ltd.....	708 Notre Dame W., Montreal.....	La Pauze.
*La Reine Molybdenum Mines Ltd.....	Room 101, 371 Bay St., Toronto.....	La Reine Tp.
Norwin Molybdenite Mines Ltd.....	26 Queen St. E., Toronto.....	Eardley Tp.
Quyón Molybdenite Co. Ltd.....	Quyón.....	Quyón.
ONTARIO—		
*Canadian Molybdenite Mines Ltd.....	36 Toronto St., Toronto.....	Tory Hill and Essonville.
*Nakina Molybdenite Mines Ltd.....	Room 714, 320 Bay St., Toronto.....	Burrows Lake.
*North American Molybdenum Corp., Ltd..	Room 602, 112 Yonge St., Toronto.....	Renfrew Co.
MANITOBA—		
*Stewart, P.....	164 Harbison Ave., Winnipeg.....	Cranberry Portage.
BRITISH COLUMBIA—		
*Powell River Molly claims.....	Box 786, Powell River.....	Powell River.

*Active but not producing.

Nickel-Copper Mining and Smelting Industry

NOTE.—(x) Active but not producing.

ONTARIO—		
Falconbridge Nickel Mines, Ltd.....	25 King St. W., Toronto.....	Falconbridge Tp.
International Nickel Company of Canada, Limited.....	Copper Cliff.....	Mines—Tps. of Levaek, Snider, McKim and Garson. Smelters—Copper Cliff and Coniston. Nickel refinery—Port Colborne. Copper refinery—Copper Cliff.
Nickel Offsets Ltd. (x).....	Room 1701, 372 Bay St., Toronto.....	Foy, Bowell and Morgan Tps.

Non-Ferrous Smelting and Refining Industry

Copper Smelting Companies

Noranda Mines, Ltd.....	2 King St. E., Toronto, Ont.....	Noranda, Que.
†International Nickel Co. of Canada, Ltd.....	67 Wall St., New York City, U.S.A.....	Copper Cliff and Coniston.
†Falconbridge Nickel Mines, Ltd.....	25 King St. W., Toronto, Ont.....	Falconbridge, Ont.
Hudson Bay Mining & Smelting Co., Ltd.....	404 Dundas St., Woodstock, Ont.....	Flin Flon, Man.

† Smelt nickel-copper ores and produce platinum and other precious metals.

Electrolytic Copper Refining Companies

Canadian Copper Refiners, Ltd. (c).....	2 King St. E., Toronto, Ont.....	Montreal East, Que.
International Nickel Co. of Canada, Ltd. (c).....	Copper Cliff, Ont.....	Copper Cliff, Ont.

(c) Also produce refined gold, silver, tellurium and selenium.

DIRECTORY OF FIRMS—Continued

Lead Smelting and Refining Company

Name	Head office address	Location
Consolidated Mining and Smelting Company of Canada, Ltd. (*)	215 St. James St. W., Montreal, Que.	Trail, B.C.

(*) Produce bismuth or bismuth-bearing bullion and antimony as by-products.

Electrolytic Zinc Refining Companies

Consolidated Mining and Smelting Company of Canada, Ltd. (*)	215 St. James St. W., Montreal, Que.	Trail, B.C.
Hudson Bay Mining and Smelting Co., Ltd. (*)	404 Dundas St., Woodstock, Ont.	Flin Flon, Man.

(*) Also produce cadmium.

Smelter and Refiner of Cobalt-Silver-Arsenic Ores

Deloro Smelting and Refining Co., Ltd. (*)	Deloro, Ont.	Deloro, Ont.
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(*) Also produce bismuth-bearing bullion and arsenic.

Refiner of Uranium-Radium Ores

Eldorado Gold Mines, Ltd.	Star Bldg., Toronto, Ont.	Port Hope, Ont.
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Producer of Primary Aluminium

Aluminum Company of Canada, Ltd.	Canada Life Bldg., Toronto (2), Ont.	Aryda and Shawinigan Falls, Que.
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Smelter of Chromium Ores

Chromium Mining and Smelting Corp.	Bank of Commerce Bldg., Hamilton, Ont.	Sault Ste. Marie, Ont.
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Producers of Platinum Metals(*)

International Nickel Co. of Canada, Ltd.	Copper Cliff, Ont.	Acton, England.
Falconbridge Nickel Mines, Ltd.	25 King St. W., Toronto, Ont.	(a)

(*) In addition to the companies listed, there are usually individual miners reporting the recovery of small quantities of alluvial platinum from streams in British Columbia. (a) Recovered by International Nickel Co. of Canada, Ltd.

Quicksilver

Cons. Mining & Smelting Co. of Canada, Ltd.	Trail	Pinchi Lake.
Empire Mercury Mines Ltd.	1818 Marine Bldg., Vancouver	Bridge River.
Sterrett, Douglas B.	Kamloops	Kamloops Dist.

Silver-Cobalt Mining Industry

Benner, R. (Silver Cross)	Box 208, Cobalt	Coleman Tp.
Bond, S. (University)	Cobalt	Coleman Tp.
Brookbank, A. (Savage)	Cobalt	Coleman Tp.
Cann, P. E. (Wattlauser)	Cobalt	S. Lorraine.
Caverley, B. (Badger)	Cobalt	Cobalt.
Cobalt Products Ltd. (x)	512 Montreal Trust Bldg., Toronto	Bucke Tp.
Comet Leasing Co.	Box 274, Cobalt	Coleman Tp.
Cross Lake Lease (O'Brien)	Box 390, Cobalt	Kerr Lake.
Davis, Adam N. (Nipissing)	Box 554, Cobalt	Coleman Tp.
Davis, Norman B. (Werner Lake)	207 Victoria Bldg., Ottawa	Cobalt.
Hudson Bay Mines Ltd. (P. Peterson)	New Liskeard	Kenora Dist.
La Rose-Rouyn Mines Ltd.	Room 507, 112 Yonge St., Toronto	Coleman Tp.
Martin, F.	Cobalt	Coleman Tp.
McCready, Russell & Giffin	Box 150, Cobalt	Wendigo.

DIRECTORY OF FIRMS—Continued

Silver-Cobalt Mining Industry—Concluded

Name	Head office address	Location
Mercier, Raoul (Tretheway).....	Bcx 547, Cobalt.....	Coleman Tp.
Millwright Mine Ltd.....	244 Bloor St. W., Toronto.....	S. Lorraine.
Morgenthaler, A. G. (Adanac).....	21085, 2nd St., Philadelphia, Pa., U.S.A.....	Coleman Tp.
Morrison, Neil (Morrison).....	Cobalt.....	Cowganda.
Murphy and Landry (Coniagas).....	Cobalt.....	Coleman Tp.
Nipissing Mining Co. Ltd. (x).....	Cobalt.....	Cobalt.
Nerlip Mines Ltd.....	46 Wolverson Ave., Toronto.....	S. Lorraine.
O'Shaughnessy, C. V. J. (x).....	Box 319, Cobalt.....	Coleman Tp.
Peterson, P. (Hudson Bay).....	Cobalt.....	Cobalt.
Puro, R. and Palmi, S. (Coniagas).....	Box 169, Cobalt.....	Coleman Tp.
Richardson, F. M. (Casey).....	Cobalt.....	Coleman Tp.
Rowe, A. and Stuckay, C. (Frontier).....	Box 755, Cobalt.....	New Liskeard.
Sobel, J. J. (Bartlett).....	Elk Lake.....	Silver Centre.
Smith, W. H. (Smith Cobalt).....	Box 221, Cobalt.....	Milner Tp.
Sutherland, J. H. (Lauson).....	Cobalt.....	Coleman Tp.
Sopha & Stewart (Cobnor).....	Box 692, Cobalt.....	Coleman Tp.
Taylor, W. D. (Frout Lake).....	Box 632, Cobalt.....	Cobalt Dist.
Temiskaming Mining Co. Ltd.....	25 King St. W., Toronto.....	S. Lorraine.
		Cobalt.

(x) Conducted milling operations.

NOTE.—In addition to the names listed, there were several small shippers from whom official reports were unobtainable.

Silver-Lead-Zinc Mining Industry

(x) Active but not producing.

NOVA SCOTIA—		
British Metal Corporation (Canada) Ltd.....	706 Dominion Square Bldg., Montreal, P.Q.....	Stirling.
QUEBEC—		
Calumet Mines Ltd. (x).....	355 St. James St. W., Montreal.....	Grand Calumet Tp.
Federal Zinc and Lead Co. Ltd. (x).....	708 Drummond Bldg., Montreal.....	Caspé Co.
Lyall and Beidelman (x).....	708 Drummond Bldg., Montreal.....	Gaspé Co.
Tetreault, P. Estate of (x).....	70 Holyrood Ave., Outremont.....	Montauban les Mines.
ONTARIO—		
Lennox Mines Co. Ltd. (x).....	132 St. James St. W., Montreal, P.Q.....	Lennox-Addington Co.
BRITISH COLUMBIA—		
Allen, Geo. (McAllister).....	Nelson.....	Slocan M.D.
Anderson, Carl (Humming Bird).....	Grand Forks.....	Greenwood M.D.
Base Metals Mining Corp. Ltd.....	350 Bay St., Toronto, Ont.....	Field.
Battal and Walters (Silver Ridge).....	New Denver.....	Slocan M.D.
Beaverdell-Wellington Synd. Ltd.....	Greenwood.....	Greenwood M..
Bergstrom, Ed. (Senator).....	Box 206, Nelson.....	Slocan M.D.
Campbell, Colin J. (Bosun).....	4675 W. 5th Ave., Vancouver.....	Slocan M.D.
Consolidated Mining & Smelting Company of Canada Ltd.....	Trail.....	Ainsworth M.D.
Cork Province Mines Ltd.....	Kaslo.....	Fort Steele M.D.
Doney, E. (Victor).....	Box 17, Sandon.....	Ainsworth M.D.
Falconer, T. W. (Dolly Varden).....	Alice Arm.....	Slocan M.D.
Galena Farm Cons. Mines Ltd.....	475 Howe St., Vancouver.....	Portland Canal M.D.
Hicks, Wm. (Ottawa).....	Slocan.....	Slocan M.D.
Highland Bell Ltd.....	Box 280, Creston.....	Slocan M.D.
Highland Chief Mine Ltd. (x).....	Box 782, Kelowna.....	Greenwood M.D.
Iron Mountain Ltd. (x).....	6 Royal Bank Bldg., Nelson.....	Greenwood M.D.
Kelly, A. W. and Herman, J. J. (Duthie).....	Smithers.....	Nelson M...
McCready, G. E. (Caledonia).....	Retallack.....	Omineca M..
Molly Hughes Inc.....	New Denver.....	Ainsworth M.D.
Noble Five Mines Ltd.....	490 Baker St., Nelson.....	Slocan M.D.
Nordman, J. L. (Tiger).....	Beaverdell.....	Slocan M..
Parker, H. M. (Hampton).....	1489 Lookout St., Trail.....	Greenwood M.D.
Ross, S. N. (Rambler-Cariboo).....	Box 166, Nelson.....	Slocan M.D.
Ruth Hope Mining Co. Ltd.....	475 Howe St., Vancouver.....	Sandon.
Sally Leasers.....	c/o J. L. Nordman, Beaverdell.....	Greenwood M.D.
Sally Mines Ltd.....	Box 1122, Penticton.....	Greenwood M.D.
Shilleen, S. (Freddie Lee).....	Sandon.....	Slocan M.D.
Silver Crest Mining Synd. (x).....	Revelstoke.....	Lardeau M.D.
Silversmith Mines Ltd. (x).....	Sandon.....	Slocan M.D.
Stedile, C. (Jo-Jo; Capella).....	New Denver.....	Slocan M.D.
Tippling, C. W. (Republic).....	Slocan City.....	Slocan M.D.
True Fissure Mine.....	Guarantee Trust Bldg., Windsor, Ont.....	Lardeau M.D.
Utica Mines Ltd. (x).....	640 W. Pender St., Vancouver.....	Ainsworth M.D.
Western Exploration Co. Ltd.....	Silverton.....	Slocan M.D.
Wesko Mines Ltd. (Centre Star).....	640 Pender St. W., Vancouver.....	Nelson M.D.
Whitewater Mine.....	Stock Exchange Bldg., Vancouver.....	Ainsworth M.D.
Zincton Mines Ltd.....	616 Stock Exchange Bldg., Vancouver.....	Slocan M.D.
YUKON—		
Settemier and Bermingham.....	Mayo.....	Mayo Dist.
Treadwell Yukon Corp. Ltd.....	1022 Crocker Bldg., San Francisco, Cal., U.S.A.....	Mayo Dist.

NOTE.—In addition to the operators shown for British Columbia, there are numerous properties worked under lease from which official reports were unobtainable.

DIRECTORY OF FIRMS—Continued

Tellurium and Selenium (See copper refiners)

Titanium Ore Mining Companies

Name	Head office address	Location
QUEBEC—		
Baie St. Paul Titanic Iron Ore Co.....	Baie St. Paul.....	St. Urbain.
Coulombe, J. A. & Co.....	126 rue St. Pierre, Quebec.....	St. Urbain.

Tungsten Mining Industry

NOVA SCOTIA—		
*Indian Path Mines, Ltd	Lunenburg.....	Lunenburg Co., N.S.
Product—Tungsten ore.		
*Guysborough Mine Ltd.....	Goldenville.....	Lake Charlotte.
Kirkpatrick Tungsten Synd.....	Goff.....	Goff.
BRITISH COLUMBIA—		
*Columbia Tungstens Co. Ltd.....	19 Rector St., New York.....	Wells.
Phillips, E.....	Minto Mine.....	Tyughton Creek.

NON-METAL MINING INDUSTRIES, INCLUDING FUELS

FUELS

DIRECTORY OF FIRMS—Continued

Coal Mining Industry

Name	Head office address	Location
NOVA SCOTIA—		
Acadia Coal Co., Ltd.	Trenton	District—
Beech Hill Coal Co.	River Hebert	Pictou
Bras d'Or Coal Co., Ltd.	Little Bras d'Or Bridge	Cumberland.
British Coal Co., Ltd.	Sydney	Cape Breton.
Cumberland Railway and Coal Co., Ltd.	Springhill	Cape Breton.
Dominion Coal Co., Ltd.	Sydney	Cape Breton.
Doucet, S. J.	Inverness	Inverness.
Evans, Geo. V.	Chimney Corner	Inverness.
Greenwood Coal Co., Ltd.	New Glasgow	Pictou
Hillcrest Mining Co., Ltd.	River Hebert	Cumberland.
Indian Cove Coal Co., Ltd.	Sydney Mines	Cape Breton.
Intercolonial Coal Co., Ltd.	Westville	Pictou
Inverness Coal Mine	Inverness	Inverness.
Joggins Coal Co., Ltd.	Amherst	Cumberland.
Lakeview Coal Co., Ltd.	Maccan	Cumberland.
Maritime Coal, Railway & Power Co., Ltd.	Amherst	Cumberland.
Old Sydney Collieries, Ltd.	Trenton	Cape Breton.
Port Hood Coal Mines, Ltd.	Port Hood	Inverness.
Shore Coal Co., Ltd.	Amherst	Cumberland.
Standard Coal Co., Ltd.	Amherst	Cumberland.
Sullivan Coal Co., Ltd.	Sydney Mines	Cape Breton.
Victoria Coal Co., Ltd.	New Glasgow	Cumberland.
NEW BRUNSWICK—		
Avon Coal Co., Ltd.	Saint John	County—
Butler, S. J.	Newcastle Bridge	Queens.
Carter, J. W.	Saint John	Queens.
Evans, W. B.	Minto	Queens.
Fearon, Bertram	Beersville	Queens.
Fearn, William	Coal Creek	Kent.
Flower, H. L.	Newcastle Creek	Queens.
Girvan, H. H.	Jailletville	Queens.
Glencross, William	Beersville	Kent.
Henderson, John	Minto	Kent.
Horgan, F. J.	Chipman	Queens.
King, G. A.	Chipman	Queens.
Lockowan Coal Co.	Chipman	Queens.
McDougal Bros.	Minto	Queens.
McMann, Hugh	Minto	Queens.
Midland Coal Co., Ltd.	Newcastle Creek	Queens.
Minto Coal Co., Ltd.	Fredericton	York-Sunbury.
Miramichi Lumber Co., Ltd.	Minto	Queens.
Mowatt, G. S.	Minto	Queens.
Nyles, Geo. H. & Co.	Chipman	Queens.
Newcastle Coal Co.	Minto	Queens.
Pennlyn Coal Co., Ltd.	West St. John	Queens.
Rothwell Coal Co., Ltd.	Minto	Queens.
Thurrott, H. P.	Newcastle Creek	Queens.
Welton, Harvey, Ltd.	Minto	Queens.
Welton & Henderson, Ltd.	Minto	Queens.
Wisely, W. B.	Chipman	Queens.
Yeamans, C. S.	Newcastle Bridge	Queens.
MANITOBA—		
Goodlands Mine Co., Ltd.	Goodlands	
SASKATCHEWAN—		
Andersen, Hans	Estevan	Area—
Andersen, Peter	Big Beaver	Souris (Estevan).
Anderson, Peter	Maxstone	Wood Mountain.
Anderson, Niels	Estevan	Wood Mountain.
Arsen, Peter	East End	Souris (Estevan).
Bakken, O. A.	Stone	East End.
Baniulis Bros.	Bienfait	Shaunavon.
Banks, H.	Pinto	Souris (Bienfait).
Banks & Lee	Pinto	Souris (Bienfait).
Beahm, George	Pinto	Souris (Bienfait).
Beauchesne, O.	Roanmine	Wood Mountain.
Bednarik, John	St. Victor	Wood Mountain.
Belz, Werner	Shaunavon	Shaunavon.
Berge, J. Telford	Buffalo Gap	Wood Mountain.
Birchard, Reg. O.	Verwood	Willow Bunch.
Bjarne Ltd.	Willow Bunch	Willow Bunch.
Bouffard, Emile	Willow Bunch	Bengough.
Bourquin & Sons, L. E.	Estevan	Willow Bunch.
		Souris (Estevan).

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Continued

Name	Head office address	Location
SASKATCHEWAN—Continued		
Bowman, Alfred	Shaunavon	Area— Shaunavon.
Boyd, J. M.	Glentworth	Wood Mountain.
Brandiezs, Jos.	Coronach	Wood Mountain.
Caritey, A.	Willow Bunch	Willow Bunch.
Cocking, Jos.	Kildeer	Wood Mountain.
Colbert Bros.	Minton	Wood Mountain.
Coronach Coal Mine	Coronach	Wood Mountain.
Covlin, M. G.	Merryflat	Shaunavon.
Cundall, George	Estevan	Souris (Estevan).
Daughinais, Robert	Fife Lake	Wood Mountain.
Delorme, Albert	St. Victor	Wood Mountain.
Dovell, A. C.	East End	East End.
Duke, A.	East End	East End.
Dunn, R., & Co.	Roche Percée	Souris (Roche Percée).
Eikemo & Peterson	Gladmar	Wood Mountain.
Elm Valley Coal Mines	Roche Percée	Souris (Roche Percée).
Emery, E. G.	Readlyn	Wood Mountain.
Erickson, Thomas	Dollard	Shaunavon.
Fair, J. A.	Hart	Wood Mountain.
Finnberg, Nils	Pir Mountain	Wood Mountain.
Fister, A. J.	Big Beaver	Wood Mountain.
Flower Bros.	Estevan	Souris (Estevan).
Fogelberg, G.	Kildeer	Wood Mountain.
Freeman, Bruce	South Fork	Shaunavon.
Furniskieg, A.	Minton	Bengough.
Garden, William	Bengough	Wood Mountain.
Gauley Mine (Oper. E. Forsberg)	Bengough	Bengough.
Gemby & Olshanoski	Estevan	Souris (Estevan).
Gill, Wm.	Estevan	Souris (Estevan).
Glombowski, Rudolph	Ardill	Wood Mountain.
Gosselin, Raymond	Willow Bunch	Willow Bunch.
Gosselin, C.	Dollard	Shaunavon.
Gregoire, D.	Dollard	Shaunavon.
Halliday, Joseph	Carnagh	Shaunavon.
Hewer, Albert	Roanmine	Wood Mountain.
Higgins, James	Willow Bunch	Willow Bunch.
Hightest Lignite Coal Co., Ltd.	Bienfait	Souris (Bienfait).
Hubert, John	Horse Creek	Wood Mountain.
Jennish Bros.	Estevan	Souris (Estevan).
Jepson, J. & Co.	Estevan	Souris (Estevan).
Kissner Coal Mine	Assiniboia	Wood Mountain.
Knoblauch, N.	Shaunavon	Shaunavon.
Krause, J. E. Estate	Shaunavon	Shaunavon.
Labocetta, John	Wood Mountain	Wood Mountain.
Lane, C. E.	Big Beaver	Souris (Roche Percée).
Langen Bros.	Roche Percée	Willow Bunch.
Lantier, L.	Willow Bunch	Wood Mountain.
Lapointe, Louis	Buffalo Gap	Wood Mountain.
Lebeck, Anton	Buffalo Gap	Wood Mountain.
Lee, A. J.	Big Beaver	Souris (Bienfait).
Lignite Coal Mines, Ltd.	Pinto	Wood Mountain.
Livingston Mine	Rockglen	Shaunavon.
Lodomez, Ernest	South Fork	Wood Mountain.
Lumb, Edwin	Willows	Wood Mountain.
Manitoba & Saskatchewan Coal Co., Ltd.	503 Ave. Bldg., Winnipeg, Man.	Souris (Bienfait).
Matheson & Uhrich	Pinto	Souris (Bienfait).
Mathieson, J. J.	Bengough	Bengough.
McBurney Bros.	Willow Bunch	Willow Bunch.
McCleary, Arch.	Mankota	Wood Mountain.
McGillis, J. M.	Willow Bunch	Willow Bunch.
McKinnon Bros.	Viceroy	Wood Mountain.
Morrow, G. R.	Big Beaver	Wood Mountain.
Mowchenko, Peter	Ardill	Wood Mountain.
Murray, H. A.	Estevan	Souris (Estevan).
Noble, R.	Mitchellton	Wood Mountain.
Nordstrom, C.	Estevan	Souris (Estevan).
Northwest Coal Co.	Bienfait	Souris (Bienfait).
Oliney & Insko	Estevan	Souris (Estevan).
Olshanoski, Joseph	Estevan	Souris (Estevan).
Osborne, B. C.	Rockglen	Wood Mountain.
Ott, Mrs. H.	Bengough	Bengough.
Ozanne, Fernand	Macworth	Wood Mountain.
Parkinson, George	Estevan	Souris (Estevan).
Parkinson, James	Estevan	Souris (Estevan).
Parkinson, Lewis	Estevan	Souris (Estevan).
Paulhus, Joseph	Willow Bunch	Willow Bunch.
Perrin, Pierre	St. Victor	Willow Bunch.
Peterson, Ray	Rockglen	Wood Mountain.
Petterson, C. S.	Estevan	Souris (Estevan).
Pobl, Henry	Buffalo Gap	Wood Mountain.
Reardon, Thomas	Shaunavon	Shaunavon.
Robinson, H.	East Poplar	Wood Mountain.
Robinson, John	Estevan	Souris (Estevan).

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Continued

Name	Head office address	Location
SASKATCHEWAN—Concluded		
Rock Springs Coal Co.	Taylorlton	Area—
Roche Percée Coal Mining Co., Ltd.	812 Boyd Bldg., Winnipeg, Man.	Souris (Bienfait).
Rowe, R. R.	Fife Lake	Souris (Roche Percée).
Salaba, G. J.	Willow Bunch	Wood Mountain.
Sanftleben, L.	Readlyn	Willow Bunch.
Scott, Ervin	Viceroy	Wood Mountain.
Siddall, Thomas	Roche Percée	Wood Mountain.
Fiodin, Chas. K.	Verwood	Souris (Roche Percée).
Slater, Dan	Ritchie	Wood Mountain.
Sogn, Mrs. C.	Snaunavon	Bengough.
Sorsdahl, W.	Snaunavon	Snaunavon.
Spirka & Novak	Snaunavon	Snaunavon.
Steele, James	Readlyn	Snaunavon.
Stefuk, J. W.	Bienfait	Wood Mountain.
Stepanski, Joseph	Taylorlton	Souris (Bienfait).
Symington, H., & Sorsdahl, L.	Snaunavon	Souris (Bienfait).
Symons, Vernon	Estevan	Snaunavon.
Tarita, Paul	Stonehenge	Souris (Estevan).
Tessier & Betland	Estevan	Wood Mountain.
Thompson, R. L.	Estevan	Souris (Estevan).
Tipple, Jim	Lonesome Butte	Souris (Estevan).
Tisdale, A. E.	Estevan	Wood Mountain.
Townsend, Mrs. Dorothy	Verwood	Souris (Estevan).
Trelaven, William H.	Bengough	Wood Mountain.
Valentine, A.	Willow Bunch	Bengough.
Viceroy Coal Mine Co.	Viceroy	Willow Bunch.
Vogel, J. D.	East End	Wood Mountain.
Wagner & Mattson	Bengough	East End.
West, Francis	Tribune	Bengough.
Western Dominion Collieries	Bienfait	Souris (Estevan).
Whitelaw, David	Hartree	Souris (Bienfait).
Wilbur, F. T.	Roche Percée	Wood Mountain.
Zieglansberger, F.	Roche Percée	Souris (Roche Percée).
		Souris (Roche Percée).
ALBERTA—		
Bituminous—		
Brazeau Collieries, Ltd.	25 King St. W., Toronto, Ont.	District—
Cadomin Coal Co., Ltd.	Cadomin	Nordeg.
Canmore Mines, Ltd.	Canmore	Mountain Park.
Flat Creek Coals, Ltd. (M. P. Johnston Op.)	212 Lancaster Bldg., Calgary	Cascade.
Hillcrest Mohawk Collieries, Ltd.	Bellevue	Highwood.
International Coal & Coke Co., Ltd.	Coleman	Crowsnest.
K. D. Collieries, Ltd.	Kaydee	Crowsnest.
Luscar Coals, Ltd.	410 Tegler Bldg., Edmonton	Mountain Park.
Maurer, J.	Beaver Mine	Mountain Park.
McDougall Coal Co.	Burmis	Crowsnest.
McGillivray Creek Coal & Coke Co., Ltd.	Coleman	Crowsnest.
McKook Bituminous Mines, Ltd.	903 Lancaster Bldg., Calgary	Crowsnest.
Mountain Park Coals, Ltd.	410 Tegler Bldg., Edmonton	Crowsnest.
Sentinel Coal Co.	Coleman	Mountain Park.
West Canadian Collieries, Ltd.	Blairmore	Crowsnest.
Wheatley, Frank & Sons	Banff	Crowsnest.
Wilson, B. A.	Pincher Creek	Cascade.
		Crowsnest.
Sub-bituminous—		
Alexo Coal Co., Ltd.	Alexo	Saunders.
Bighorn & Saunders Creek Collieries, Ltd.	Saunders	Saunders.
Bryan Power & Coal Co., Ltd.	Robb	Coalspur.
Campbell Bros. & Wilkinson	Priddis	Pekisko.
Coal Valley Mining Co., Ltd.	Coal Valley	Coalspur.
Davies, G. C.	Priddis	Pekisko.
Foothills Collieries, Ltd.	Foothills	Coalspur.
Hinton Collieries, Ltd.	Hinton	Prairie Creek.
Jasper Coal Co., Ltd.	Edmonton	Prairie Creek.
Lakeside Coals, Ltd.	Edmonton	Coalspur.
McLeod River Hard Coal Co., Ltd.	Mercoal	Coalspur.
Purdy & Co.	Lundbreck	Pincher.
Quick Flame Coal Mine	Lundbreck	Pincher.
Sterling Collieries Co., Ltd.	Edmonton	Coalspur.
Sunglow Coal Mine	Priddis	Pekisko.
Swan, H. & Son	Priddis	Pekisko.
Lignite—		
Aetna Coal Co.	East Coulee	Drumheller.
Anderson, H. A.	Teepee Creek	Sexsmith.
Annon, J. L.	Bow Island	Taber.
Anonson, A. W.	Rosalind	Castor.
Armstrong, John	Castor	Castor.
Balogh, Aaron (Arctic Coal Co.)	Carbon	Carbon.
Balogh Coal Co., Ltd.	Carbon	Carbon.
Banner Coals Ltd.	Edmonton	Edmonton.
Batchelor & Arnold	Box 261, Lethbridge	Lethbridge.

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Continued

Name	Head office address	Location
ALBERTA—Continued		
<i>Lignite—Continued</i>		District
Beverley Coal Co., Ltd.	9424-98 Ave., Edmonton	Edmonton.
Bignell, E. L.	Gadsby	Castor.
Bish Bros.	Forestburg	Castor.
Bitterman, J.	Forestburg	Castor.
Blackfoot Band of Indians	Gleichen	Gleichen.
Blades, James	Delburne	Ardley.
Blair, John	Picture Butte	Lethbridge.
Booth, Harry	Beverly	Edmonton.
Bordula, A. J.	Hanna	Sheerness.
Bradley, James	Foreman	Castor.
Brajich, Mrs. Bertha	560-2nd St., Medicine Hat	Pakowki.
Bright Service Mine	Edmonton	Edmonton.
Brilliant Coal Co., Ltd.	Drumheller	Drumheller.
Burnham, George	12009-57 St., Edmonton	Edmonton.
Burton, Mrs. A. A.	Drumheller	Drumheller.
Bush Mines Ltd.	Edmonton	Edmonton.
Rye, E. I.	Lucky Strike	Milk River.
Campbell, C. C.	Trochu	Carbon.
Campkin & Sons, R.	Lousana	Big Valley.
Canadian Dinant Coal Co., Ltd.	Dinant	Camrose.
Canadian Dinant Coal Co., Ltd.	Three Hills	Carbon.
Cattoni, A.	Champion	Champion.
Celtic Co-op. Ass'n, Ltd.	Wayne	Drumheller.
Cherrille Coal Co.	7106-106 St., Edmonton	Wetaskiwin.
Cheshire & Son, S.	Heisler	Castor.
Chester, J. C.	Lethbridge	Lethbridge.
Chiarello, Frank	Legal	Edmonton.
Chinook Coal Co., Ltd.	Sheerness	Sheerness.
Chiswick, James	Gadsby	Castor.
City of Lethbridge	Lethbridge	Lethbridge.
Clark, Edward	Big Valley	Big Valley.
Colonel, D. C.	Edberg	Castor.
Comet Coal Co., Ltd.	East Coulee	Drumheller.
Commander Coal Co.	Drumheller	Drumheller.
Cordel, J. F.	Halkirk	Castor.
Costello & Son, H.	Standard	Gleichen.
Cotek, Wm.	R. R. 3, S. Edmonton	Edmonton.
Crawford, A. J.	Alix	Ardley.
Dawson Coal Ltd.	Edmonton	Edmonton.
Denio, E.	Drumheller	Drumheller.
Dickinson, Knight & Dickinson	R. R. 2, St. Albert	Edmonton.
Dunbar & Partners, Jas.	Hinton	Halcourt.
Duncan, N. S. (Blackfoot Band of Indians.)	Cluny	Gleichen.
Duncombe, W. V.	Taber	Taber.
Dunn Bros.	Taber	Taber.
Edmonton Collieries Ltd.	10055-101 St., Edmonton	Edmonton.
Elgin Coal Co., Ltd.	Drumheller	Drumheller.
Empire Collieries, Ltd.	Eastview	Drumheller.
Evans & Son	Taber	Taber.
Fewing Bros.	Rosalind	Castor.
Falvo, D.	Dodds	Tofield.
Finlayson, W. J. B.	Bassano	Gleichen.
Foye, Edward B.	Willow Creek	Drumheller.
Fraser-Mackay Collieries, Ltd.	10055-101 St., Edmonton	Edmonton.
Fraser & Sons, Alec	Carmangay	Champion.
Garred, Laverne W.	Pakan	Pakan.
Geddes, Wm.	Little Plume	Pakowki.
Gibb & Ball	Edmonton	Edmonton.
Gibson, George	Grassy Lake	Taber.
Gill, Peter	Thorsby	Wetaskiwin.
Gordon, D. L.	Nevis (formerly Halkirk in Castor district)	Ardley.
Gotheridge & Sons, W. T.	Round Hill	Camrose.
Great West Coal Co., Ltd., The	10117-100A St., Edmonton	Edmonton.
Greig & Rosland	Millet	Wetaskiwin.
Guiney, J.	Rosebud	Gleichen.
Gunderson Brick & Coal Co., Ltd.	Redcliff	Redcliff.
Gwilliam, D. J.	Namoo	Edmonton.
Gwynne Coal Co.	Gwynne	Wetaskiwin.
Haden, Joseph	Castor	Castor.
Halburt Bros.	Trochu	Carbon.
Halburt, Robert A.	Perbeck	Big Valley.
Hamilton Coal Co., J. J.	Box 140, Lethbridge	Lethbridge.
Hamilton, John	Delia	Drumheller.
Harrison, H.	Scollard	Big Valley.
Hemstock, J. R.	Hanna	Sheerness.
Henderson, J.	Lomand	Champion.
Herbaut, A.	Champion	Champion.
Hirny & Hutchinson	Hollow Lake	No area.
Hodgson & Son, Joseph	Rowley	Carbon.
Horz, Louis E.	Evansburg	Pembina.
Hronek, Ben	Halkirk	Castor.

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Continued

Name	Head office address	Location
ALBERTA—Continued		
Lignite—Continued		District—
Ironside, T. G.	R. R. 2, Scapa	Sheerness.
James, A. J.	Forestburg	Castor.
Johnson, Alex.	Ardley	Ardley.
Johnson, M. F.	Haynes	Ardley.
Kalin, J.	Three Rivers	Carbon.
Kent Coal Co., Ltd.	Edmonton	Edmonton.
King, Horsky & Low.	Delia	Edmonton.
Kirkeby, B. A.	Craigmyle	Sheerness.
Klapstein & Opalinski (Pine Creek Coal Co.)	R. R. 3, S. Edmonton.	Edmonton.
Kleenbirm Collieries, Ltd.	Eyremore	Brooks.
Komperdo, G.	R. R. 2, Millet	Wetaskiwin.
Kurp, Carl	Alix	Ardley.
Kurp, Thos. J.	Delburne	Ardley.
Lakeside Coals, Ltd.	Edmonton	Pembina.
Larson & Lien	Edberg	Castor.
Leith & Hunter (Operators Gibb & Ball.)	Edmonton	Edmonton.
Lethbridge Collieries, Ltd.	Lethbridge	Lethbridge.
Lethbridge Co-op. Mines Ass'n, Ltd.	732-13 St., Lethbridge	Lethbridge.
Long Coal Co.	Namoo	Edmonton.
Low Valley Coal Co.	Camrose	Camrose.
Lynass, John & A.	Delburne	Ardley.
Maggs, G.	Barnwell	Taber.
Malone & Lindenberger	Mayerthorpe	Whitecourt.
Maple Leaf Minerals, Ltd.	Drumheller	Drumheller.
Marcus Coal Co.	10366-104 St., Edmonton	Edmonton.
Marsh & Son, Walter	Banff	Castor.
Marshall & Heisz Coal Co.	Donalda	Castor.
Masciangelo & Partners, J (A. C. Marshall)	Delia	Sheerness.
May, John	10136-95 St., Edmonton.	Edmonton.
McGaw, A. M. S.	Champion	Champion.
McGladrie & Kehl	Nevis	Ardley.
McKinlay & Son, James	Huxley	Big Valley.
McMillan, Wm	Box 44, Rosebud	Gleichen.
Meads, C. R.	Holborn	Pembina.
Meak, L. G.	Heisler	Castor.
Menini, A.	Maleb	Taber.
Metcalfe, L. R.	Delburne	Ardley.
Midland Coal Mining Co., Ltd.	Drumheller	Drumheller.
Miller, W. F.	Hillspring	Magrath.
Mills & Sons, J. J.	Rosalind	Castor.
Mitchell, Wm	Dimsdale	Halcourt.
Mitchinson, Thos.	Donalda	Castor.
Minute Coal Co.	Drumheller	Drumheller.
Monarch Coal Mining Co., Ltd.	Drumheller	Drumheller.
Moran, James	Carbondale	Edmonton.
Morel, J. D.	Three Hills	Carbon.
Morrill, Wm	Beynon	Drumheller.
Morse, W. J.	Hanna	Sheerness.
Mueller, John J.	Masinasin	Milk River.
Mullen & Collett	Taber	Taber.
Muncy, H. C.	Foreman	Castor.
Murray Collieries, Ltd.	East Coulee	Drumheller.
Myronuk, Wm.	Andrew	Pakan.
Ness, Mrs. Ethel.	Nevis	Ardley.
New Barnes Mine	Lethbridge	Lethbridge.
Newcastle Collieries, Ltd.	Drumheller	Drumheller.
Nimko & Senectko	Box 4108, S. Edmonton.	Edmonton.
North American Collieries	Drumheller	Drumheller.
Nottal & Davidson	Three Hills	Carbon.
Oliphant, J. H.	Carbon	Carbon.
Oliphant, John (Ajax Coal Co.)	212 Aberdeen St., Medicine Hat	Redcliff.
Oliver, K. & E.	Box 234, Taber	Taber.
Ottewell Coal Co.	Clover Bar	Edmonton.
Pahl, Fred M.	Hanna	Sheerness.
Parker, L.	Cardiff	Edmonton.
Paton, Thomas A.	Delburne	Ardley.
Peerless Carbon Collieries, Ltd.	Carbon	Carbon.
Perini & Sons, Carlo	Granlea	Pakowki.
Phillips, Wm. T.	Castor	Castor.
Pickering & Ordege	Donalda	Castor.
Pickering, B.	Beynon	Drumheller.
Poholka, M.	Box 4031, S. Edmonton.	Edmonton.
Popovich, Mike	Champion	Champion.
Proskew, Joseph	Dinant	Camrose.
Rader, W.	Elkwater	Pakowki.
Ratz, Steve	Warburg	no area.
Razzolini & Predarolli	Magrath	Lethbridge.
Red Deer Valley Coal Co., Ltd.	Drumheller	Drumheller.
Red Flame Coal Co.	Round Hill	Camrose.
Red Hot Coal Co., Ltd.	Forest Heights (Edmonton)	Edmonton.
Regal Coal Co., Ltd.	East Coulee	Drumheller.

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Continued

Name	Head office address	Location
ALBERTA—Continued		
Lignite—Concluded		District—
Remillard, J. B.	Castor	Castor.
Reville, Walter	Tothill	Pakowki.
Rhodes, George	Champion	Champion.
Richards, E.	S. Edmonton	Edmonton.
Riverdale Coal Co., Ltd.	9757-93rd Ave., Edmonton	Edmonton.
Rizzi, Peter	Reco	no area.
Rodway, A. G.	Halkirk	Castor.
Hollingson, George	Box 432, Lethbridge	Lethbridge.
Rollingson, John	Lethbridge	Lethbridge.
Rosedale Collieries, Ltd.	Aerial	Drumheller.
Rosedale Collieries, Ltd.	Rosedale	Drumheller.
Rota, Cattoni & Viola	Magrath	Lethbridge.
Roxy Coal Co.	11637-92nd St., Edmonton	Edmonton.
Royal View Mine	702-15th St. N., Lethbridge	Lethbridge.
Russel, Chas. O.	Alix	Ardley.
Ryming, James W.	Rowley	Carbon.
Samis Collieries	Namoo	Edmonton.
Sank, John	Heisler	Castor.
Schaniel, A. C.	Huallen	Halcourt.
Schlender, Otto	Trochu	Carbon.
Schneider, N.	Dimsdale	Halcourt.
Schnepf, Karl	Rosebud	Gleichen.
Schute, George, et al.	Dinant	Camrose.
Shaw, Mrs. Mary	Castor	Castor.
Sheerness Coal Co., Ltd.	Sheerness	Sheerness.
Simmons, E. W.	Forestburg	Castor.
Sinoski, M.	Box 4042, Edmonton S.	Edmonton.
Sissons, Clive	Alix	Ardley.
Snider, C. G.	Edmonton S.	Edmonton.
Speed, Tim	Milk River	Milk River.
Spencer & Dolphin	Carbon	Carbon.
Steffen & Dragon	Ryley	Tofield.
Stoney Creek Collieries, Ltd.	Camrose	Camrose.
Strader, Chas.	Halkirk	Castor.
Strilchuk, L.	Ohaton	Camrose.
Strom Bros.	Burdett	Taber.
Stubbs, T. E.	Hanna	Sheerness.
Sturit, Geo.	Gainford	Pembina.
Super-Heat Coal Co., Alta., Ltd.	Ardley	Ardley.
Superior Grade Coal Co., Ltd.	Wayne	Drumheller.
Sutherland & Sons, W. A.	Pickardville	Westlock.
Sward, Henry	Rose Lynn	Sheerness.
Tario Bros.	Delia	Sheerness.
Taylor, Thomas	Groton	Milk River.
Taylor & Miller	Bon Accord (7203-118th Ave., Edmonton)	Edmonton.
Thorhild Coal Co.	Box 44, Thorhild	Rochester.
Tissington, J. B.	Grande Prairie	Halcourt.
Tofield Coal Co., Ltd.	Tofield	Tofield.
Tredway Coal Co., Ltd.	Dodds	Tofield.
Trentham, A.	Three Hills	Carbon.
Turner, Cowger & Cowger	Beaverlodge	Halcourt.
Turner, L.	Dimsdale	Halcourt.
Tyrlik, John	Heisler	Castor.
Unsworth, George	R. R. 2, Scapa	Sheerness.
Valentini, M.	Bow Island	Taber.
Vargo, Steve	Magrath	Lethbridge.
Wallwork, W.	Bow Island	Taber.
Wallwork & Hesketh	Box 213, Taber	Taber.
Walker, G.	Burtonsville	Pembina.
Watson, Alex	Blue Ridge	White Court.
Watson, Mrs. C.	Big Valley	Big Valley.
Wayne Coal Producers Ass'n.	Wayne	Drumheller.
Waytowich, E.	Radway	Rochester.
Western Gem & Jewel Collieries, Ltd.	Rosedale Sta.	Drumheller.
Wilkinson, F. E.	Donalda	Castor.
Williams & Partners	Taber	Taber.
Wiltse & Line	Forestburg	Castor.
Wiltse, Floyd N.	Halkirk	Castor.
Winkler, G. E.	10904-123rd St., Edmonton	Pembina.
Wynnychuk, Steve	Pakan	Pakan.
Yard & Son, George C.	Trochu	Carbon.
Young, A.	Halkirk	Castor.
BRITISH COLUMBIA—		
Aveling Coal Co., Ltd.	Telkwa, Box 9	District—
Behan, Frank, Lumber Co., Ltd.	Nanaimo, Box 365	Inland.
Biggs, James	Wellington	Island.
Bulkley Valley Collieries, Ltd.	Telkwa	Inland.
Canadian Collieries (Dunsmuir), Ltd.	Nanaimo	Island.
Cassidy Mines	18 Watkins St., Nanaimo	Island.
Chambers, R. H.	86 Victoria Rd., Nanaimo	Island.
Coalmont Collieries, Ltd.	Coalmont	Inland.
Crow's Nest Pass Coal Co., Ltd.	Fernie	Crow's Nest Pass.

DIRECTORY OF FIRMS—Continued

Coal Mining Industry—Concluded

Name	Head office address	Location
BRITISH COLUMBIA—Concluded		
Gething, King	Hudson Hope	District
Granby Cons. M., S. & P. Co., Ltd.	Princeton	Inland.
Lantzville Collieries, Ltd.	Lantzville	Inland.
Leonard, L. D. & A. A.	Ashcroft	Inland.
Lewis, Thomas	51 Kennedy St., Nanaimo	Inland.
Loudon, William D.	Wellington	Inland.
Middlesboro Collieries, Ltd.	Merritt	Inland.
Princeton Tulameen Coal Co., Ltd.	Box 288, Princeton	Inland.
Richardson, Abraham Benj.	R.R. 1, Ladysmith	Inland.

Crude Oil Producers in Canada, 1940

(*) Producers of 300 barrels or more during the year.

(a) Drillers only.

(b) Producer and driller.

(c) Producing wells drilled in 1940—no output reported.

(d) Dry wells drilled in 1940.

(e) Operates an absorption plant.

(f) In addition to drilling and operating wells in the Turner Valley field, the company operates two absorption plants

NEW BRUNSWICK—		
New Brunswick Gas & Oilfields, Ltd.	Moncton	Stony Creek.
ONTARIO—		
Aetna Oil Co., Ltd.	31 Ouellette Ave., Windsor	Field—
Atkinson, John	Petrolia	Bothwell.
Barnes, Henry	Oil Springs	Petrolia and Enniskillen.
Barrett, C.	Petrolia	Oil Springs.
Beattie, James and John	Glencoe	Petrolia and Enniskillen.
Brock, Thomas A.	Petrolia	Warwick.
Brown, Jas. F.	Corunna	Petrolia and Enniskillen.
Byers, R. and G.	Oil Springs	Moore and Sarnia.
Canadian Oil Companies, Ltd.	Terminal Bldg., Toronto	Oil Springs.
Canadian Penn. Grade Producers, Ltd.	Brantford	Petrolia and Enniskillen.
Cole, W. J.	Petrolia	Onondaga.
Collins, Matthew	Petrolia	Petrolia and Enniskillen.
Corey, Harrison	Petrolia	Petrolia and Enniskillen.
Creed, Joseph A.	Petrolia	Petrolia and Enniskillen.
Dark, W. B. (a)	3676 Berkshire Ave., Detroit, Mich., U.S.A.	Petrolia and Enniskillen.
Davidson, F. L. (a)	Bothwell	
Delhi Gas Syndicate	Wingham	
Demaray, Clarence (a)	Cayuga	Bothwell.
Dennis, C.	Kerwood	
Dennis, W.	Oil Springs	Oil Springs.
Domestic Gas & Oil Co., Ltd.	Oil Springs	Oil Springs.
Dominion Oil Co.	36 Toronto St., Toronto	Bothwell.
Dominion Petroleum Co., Ltd. (b)	c/o P. H. Fitzpatrick, Grant Hotel, 2931 John R. St., Detroit, Mich., U.S.A.	Bothwell.
Donald, George	Bank of Montreal Bldg., London	Mosa.
Earl, Sydney (a)	Oil Springs	Oil Springs.
Edward, F. H.	Kerwood	
Fairbank, J. H., Estate of	Petrolia	Petrolia and Enniskillen.
Gillespie, W. O.	Petrolia	Oil Springs.
Goudie, Elroy	Petrolia	Petrolia and Enniskillen.
Gregory & Son, G. F. (a)	Petrolia	Petrolia and Enniskillen.
Hamlin, F. G.	Petrolia	
Heal, Andrew A. (b)	Corunna	Petrolia and Enniskillen.
Henderson, Wm.	Petrolia	Warwick.
High Grade Natural Gas Co., Ltd. (b)	Chatham	Petrolia and Enniskillen.
Hillis Bros.	Oil Springs	Oil Springs.
Hillside Syndicate (Geo. Graff)	Oil Springs	Oil Springs.
Holmes, E. B. (b)	25 Market Place, Stratford	Bothwell.
Houston, Merle B.	Bothwell	Bothwell.
Howlett & Sons, Ltd., F. W.	853 Hellmuth Ave., London	Petrolia and Enniskillen.
Hunter, G. (a)	Petrolia	Petrolia and Enniskillen.
Hussey, W. J. (a)	Charing Cross	
Jackson, P. L. (b)	Petrolia	
Johnston, J. B. (a)	Dunnville	
Kay, W. K.	London	Warwick.
Kells, E. E. (b)	Oil Springs	Oil Springs.
Kelly, J. E.	Petrolia	Petrolia and Enniskillen.
Kerr, John, Estate of	Petrolia	Petrolia and Enniskillen.
Lather, Arthur	Bothwell	Petrolia and Enniskillen.
Lather, D. C. & Robert	Bothwell	Bothwell.
Lennan, L. A.	Bothwell	Bothwell.
Leverson & Buckenham	Box 514, Petrolia	Petrolia and Enniskillen.
Lewis, Laura & Wm.	Bothwell	Bothwell.
Lidster, G. H. & J. H.	Oil Springs	Oil Springs.
Lotan, Percy	Wallacetown	Bothwell.
MacGillivray, G. A.	Bothwell	Bothwell.
Marcus, A.	484 Ridout St., London	Oil Springs.
	Bothwell	Bothwell.

DIRECTORY OF FIRMS—Continued

Crude Oil Producers in Canada, 1940—Concluded

Name	Head office address	Location
ONTARIO—Concluded		
McCort, T. H.	Petrolia	Field—
McCrie, R. D. (a)	Bothwell	Petrolia and Enniskillen.
McCutcheon, A. P.	Oil Springs	
McGaffey, R. (a)	Kerrwood	Oil Springs.
McGill, Joseph	Bothwell	
McMillan & Marvin	Bothwell	Bothwell.
McMillan & Warwick	Bothwell	Bothwell.
McMullen, R. (a)	Manitowaning	Bothwell.
Mitchell, Chas.	Oil Springs	
Mitchell, Robert	Oil Springs	Oil Springs.
Morningstar, H. M.	Oil Springs	Oil Springs.
Morningstar, L. H.	Oil Springs	Oil Springs.
Ontario Lands & Oil Co., Ltd., The	Petrolia	Oil Springs.
Petrol Oil & Gas Co., Ltd., The	414 Bay St., Toronto	Petrolia and Enniskillen.
Pope, H. O.	Bothwell	Dover.
Pope, Wm., Jr.	Bothwell	Bothwell.
Prairie Gas & Oil Co., Ltd. (N.P.L.)	350 Bay St., Toronto 2	Thamesville.
Rawson, W. J.	Petrolia	Dover.
Reid-Adams Development Co., Ltd.	110 Dundas St., London	Petrolia and Enniskillen.
Ricker, A. (a)	Canboro	Warwick.
Rowe, E. P.	350 Bay St., Toronto	
Saroline Oil Co., Ltd.	1804 Christina St., Sarnia	Dover East.
Schoolcraft, W.	6526 London Ave., Detroit, Mich., U.S.A.	Petrolia and Enniskillen.
Shain, Viola	Copleston	Warwick.
Slack, Charles	Petrolia	Petrolia and Enniskillen.
Smith, Dr. Luke	Chatham	Petrolia and Enniskillen.
Sproule Bros.	Oil Springs	
Sutherland, B. M.	Petrolia	Oil Springs.
Tunks, James	Bothwell	Oil Springs.
Union Gas Co. of Canada, Ltd.	Gas Bldg., Chatham	Bothwell.
Von Berg, Dr. John	8070 East Outer Drive, Detroit, Mich., U.S.A.	Dawn.
Ward, Noble	Petrolia	Bothwell.
Warwick, Joseph	Oil Springs	Petrolia and Enniskillen.
Willits, G. F. (a)	Bothwell	Oil Springs, Bothwell.
Wilson-Sullivan Development Co.	110 Davis St., Sarnia	
Windover, Wm. (a)	Sarnia	Warwick.
Winnett, J. W. G.	418 Talbot St., London	
Woodward, Wm.	Oil Springs	Bothwell.
Wright, E. (a)	Petrolia	Oil Springs.
Yorks, Frank	Petrolia	
SASKATCHEWAN—		
Dina Oil Refining Co., Ltd.	Lloydminster	Petrolia, Enniskillen and Warwick.
Northern Utilities		Dina.
ALBERTA—		
Advance Oil Co., Ltd.	200 Leeson-Lineham Block, Calgary	Turner Valley.
Alberta Oil Incomes, Ltd.	301 Lancaster Bldg., Calgary	Turner Valley.
Alberta Pacific Consolidated Oil, Ltd. (a)	302 Toronto General Trusts Bldg., Calgary	Turner Valley.
Alliance Oil Co., Ltd.	304 Toronto General Trusts Bldg., Calgary	Highwood.
Anglo-Canadian Oil Co., Ltd.	902 Lancaster Bldg., Calgary	Mill Creek.
Argus Royalties, Ltd.	902 Lancaster Bldg., Calgary	Turner Valley.
Arrow Royal Royalties, Ltd.	304 Toronto General Trusts Bldg., Calgary	Turner Valley.
Associated Oil & Gas Co., Ltd.	200 Leeson-Lineham Bldg., Calgary	Turner Valley.
B & B Royalties, Ltd.	232 Lougheed Bldg., Calgary	Turner Valley.
Baltic Oils, Ltd.	200 Leeson-Lineham Block, Calgary	Turner Valley.
Barsac Royalties Ltd.	Toronto General Trusts Bldg., Calgary	Turner Valley.
Battleview Oils Ltd. (a)	80 Richmond St., Toronto, Ont.	Battleview.
British American Oil Co., Ltd. (e)	1312 Royal Bank Bldg., Toronto, Ont.	
British Colonial Oils, Ltd.	503 Lancaster Bldg., Calgary	Turner Valley.
Brown Oil Corp., Ltd.	232 Lougheed Bldg., Calgary	Turner Valley.
Calmont Oils Ltd.	Toronto General Trusts Bldg., Calgary	Turner Valley.
Calvin Royalties Ltd.	301 Lancaster Bldg., Calgary	Turner Valley.
Carleton Royalties Ltd.	105 Bank of Commerce Chambers, Calgary	Turner Valley.
Command Oils Ltd.	4 Clarence Block, Calgary	Turner Valley.
Common Oil Ltd.	4 Clarence Block, 112-8th Ave. W., Calgary	Turner Valley.
Commonwealth Drilling Co. (a)	Calgary	
Coronation Royalties Ltd.	902 Lancaster Bldg., Calgary	Turner Valley.
D & D Royalties	Toronto General Trusts Bldg., Calgary	Turner Valley.
Dalhousie Oil Co., Ltd.	606 2nd St. W., Calgary	Turner Valley.
Davies Petroleum Ltd. (N.P.L.)	409 Lancaster Bldg., Calgary	Turner Valley.
Duna Oil & Refining Co., Ltd.	Lloydminster, Sask.	Dina.
Director Royalties Ltd.	600 Lancaster Bldg., Calgary	Turner Valley.
Drilling Contractors Ltd. (a)	902 Lancaster Bldg., Calgary	
East Coast Oil Co., Ltd.	409 Maclean Block, Calgary	
Edmonton-Wainwright Oils, Ltd.	8 McDougall Court, Edmonton	Turner Valley.
Empress Oil Co., Ltd.	304 Toronto General Trusts Bldg., Calgary	Wainwright.
Extension Oil Co., Ltd.	902 Lancaster Bldg., Calgary	Turner Valley.
Federated Petroleum Ltd.	232 Lougheed Bldg., Calgary	Turner Valley.
Firestone Petroleum Ltd.	902 Lancaster Bldg., Calgary	Turner Valley.
Footbills Oil & Gas Co., Ltd.	606-2nd St. W., Calgary	Turner Valley.
Foundation Petroleum Ltd.	902 Lancaster Bldg., Calgary	Turner Valley.
Four Star Petroleum Ltd.	232 Lougheed Bldg., Calgary	Turner Valley.

DIRECTORY OF FIRMS—Continued

Crude Oil Operators in Canada, 1940—Concluded

Name	Head office address	Location
ALBERTA—Concluded		
Franco Oils Ltd. (a).....	Moose Jaw, Sask.	Field.
Frankview Oils Ltd.	Suite 2008-80 Richmond St. W., Toronto, Ont.	Turner Valley.
Frontier Royalties Ltd.	902 Lancaster Bldg., Calgary.....	Battleview-Vermilion.
Gas & Oil Products, Ltd. (e).....	301 Lancaster Bldg., Calgary.....	Turner Valley.
Globe Royalties Ltd.	401 Leeson-Lineham Block, Calgary.....	Turner Valley.
Granville Oils Ltd. (N.P.L.).....	638 Columbia St., New Westminster, B.C.	Turner Valley.
Harris, George Syndicate.....	201 Lancaster Bldg., Calgary.....	Turner Valley.
Highwood-Sarcee Oils, Ltd.	614 Lancaster Bldg., Calgary.....	Turner Valley.
Home Oil (Alberta) Ltd.	304-744 West Hastings St., Vancouver, B.C.	Turner Valley.
Hylo Oils Ltd.	120-7th Ave. W., Calgary.....	Turner Valley.
Independent Royalties Ltd. (a).....	403 Lancaster Bldg., Calgary.....	Turner Valley.
Lethbridge Petroleum Ltd. (a).....	31-36 Union Bldg., Calgary.....	Lethbridge.
McDougal-Segur Exploration Co. of Can., Ltd.	3-405-8th Ave. W., Calgary.....	Turner Valley.
Mercury Oils Ltd.	301 Lancaster Bldg., Calgary.....	Turner Valley.
Merland Oil Co. of Can., Ltd.	436 Loughheed Bldg., Calgary.....	Turner Valley.
Miracle Oils Ltd.	301 Lancaster Bldg., Calgary.....	Turner Valley.
Model Oils Ltd.	201 Lancaster Bldg., Calgary.....	Turner Valley.
Model Spooner Syndicate.....	717 Lancaster Bldg., Calgary.....	Turner Valley.
Monarch Royalties Ltd.	902 Lancaster Bldg., Calgary.....	Turner Valley.
Moose Oils Ltd.	714 Lancaster Bldg., Calgary.....	Moose Dome.
National Petroleum Corp., Ltd.	401 Leeson-Lineham Block, Calgary.....	Turner Valley.
Newell & Chandler Ltd. (a).....	209-6th Ave. W., Calgary.....	Turner Valley.
Northwest Co. Ltd.	56 Church St., Toronto, Ont.	Turner Valley.
Oil Ventures Ltd.	600 Lancaster Bldg., Calgary.....	Turner Valley.
Okalta Oils Ltd.	Renfrew Bldg., Calgary.....	Turner Valley.
Pacific Petroleum Ltd.	209-6th Ave. W., Calgary.....	Turner Valley.
Prairie Royalties Ltd.	902 Lancaster Bldg., Calgary.....	Turner Valley.
Ram River Oils Ltd. (a).....	728 Tegler Bldg., Edmonton.....	Ram River.
Regal Royalties Ltd. (a).....	403 Leeson-Lineham Block, Calgary.....	Turner Valley.
Roxana Oils Co., Ltd. (a).....	809 Lancaster Bldg., Calgary.....	Kootenay Dome.
Royal Canadian Oils Ltd.	403 Lancaster Bldg., Calgary.....	Turner Valley.
Royal Crest Petroleum Ltd.	232 Loughheed Bldg., Calgary.....	Turner Valley.
Royalite Oil Co., Ltd. (f).....	606-2nd St. W., Calgary.....	Turner Valley.
Sasko-Wainwright Oil & Gas, Ltd.	103 Bowerman Bldg., Saskatoon, Sask.	Wainwright.
Share Royalties Ltd.	61 Canada Life Bldg., Calgary.....	Turner Valley.
Southwest Petroleum Co., Ltd.	606-2nd St. W., Calgary.....	Turner Valley.
Sovereign Royalties Ltd.	317 Alberta Corner, Calgary.....	Turner Valley.
Spy Hill Royalties Ltd.	902 Lancaster Bldg., Calgary.....	Turner Valley.
Standard Oil Co. of B.C., Ltd.	906 Marine Bldg., Vancouver, B.C.	Princess.
Sterling Royalties Ltd.	105 Bank of Commerce Chambers, Calgary	Turner Valley.
Structure Oil & Gas Co., Ltd.	Canadian Credit Men's Association Ltd., Trustee, Calgary.....	Turner Valley.
Sunhurst Oil Co., Ltd.	800 Lancaster Bldg., Calgary.....	Turner Valley.
Sundance Royalties Ltd.	902 Lancaster Bldg., Calgary.....	Turner Valley.
Sunray Petroleum Corp. (a).....	613 Transportation Bldg., 132 St. James St., Montreal, Que.	Turner Valley.
Sunset Oils Ltd.	302 Toronto General Trusts Bldg., Calgary.....	Turner Valley.
Three Point Petroleum Ltd.	232 Loughheed Bldg., Calgary.....	Turner Valley.
Turner Valley Oil Co., Ltd.	531 Loughheed Bldg., Calgary.....	Turner Valley.
Turner Valley Royalties Ltd.	232 Loughheed Bldg., Calgary.....	Turner Valley.
Twin Valley Oil Co., Ltd.	304 Toronto General Trusts Bldg., Calgary.....	Turner Valley.
Vanalta Ltd.	Johnston St., Granville Island, Vancouver, B.C.	Red Coulee.
Vanpeg Royalties Ltd.	301 Lancaster Bldg., Calgary.....	Turner Valley.
Vulcan-Brown Petroleum Ltd.	232 Loughheed Bldg., Calgary.....	Turner Valley.
Wain-Con Oils Ltd.	431 Tegler Bldg., Edmonton.....	Wainwright.
Wainwright Petroleum Ltd.	Bank of Toronto Bldg., Edmonton.....	Wainwright.
Western Drilling Co., Ltd.	Herald Bldg., Lethbridge.....	Vermilion.
Westflank Oil Co., Ltd.	902 Lancaster Bldg., Calgary.....	Turner Valley.
Westside Royalties Ltd.	232 Loughheed Bldg., Calgary.....	Turner Valley.
Widney, Roy J.	Turner Valley	Turner Valley.
Winalta Royalties Ltd.	301 Lancaster Bldg., Calgary.....	Turner Valley.
York Oils, Ltd.		
NORTHWEST TERRITORIES—		
The Northwest Co., Ltd.	56 Church St., Toronto, Ont.	Fort Norman.

DIRECTORY OF FIRMS—Continued

Natural Gas Industry

- (a) Drilling only. (d) Dry wells drilled in 1940.
 (b) Distributing only. (e) Drilling and producing.
 (c) Producing wells drilled in 1940—no output reported. (f) Pipeline company.
 (g) Using or selling gas from absorption plant.

Name	Head office address	Location
NEW BRUNSWICK—		Field—
Moncton Electricity & Gas Co. Ltd.	700 Main St., Moncton	Stony Creek.
New Brunswick Gas & Oilfield Ltd.	Moncton	
ONTARIO—		TOWNSHIP—
Achilles Gas Co. (c) (d)	Dunnville	Seneca.
Adam & Truemner	305-57 Queen St. W., Toronto	Dereham.
Ajax Gas & Oil Co. Ltd. (e)	85 Richmond St. W., Toronto	Dover, Middleton.
		Willoughby, Tuscarora.
Allen, A. J. (a)	Dunnville	Raleigh.
Aloka Oil Co., Ltd.	Room 305-57 Queen St. W., Toronto	Willoughby.
Argonaut Gas & Oil Co.	Dunnville	Dereham, Malahide.
Barnhart, Mrs. E.	Stevensville	Woodhouse.
Beacon Nat. Gas Syndicate	112 Locust St., Kitchener	Bertie.
Beaver, Utilities (b)	c/o Premier Trust Co., London	Walpole.
Beer, George	Binbrook	
Belmont, Gas Co. (b)	Windsor	Binbrook.
Benn, A. S.	Hagersville, R.R.I.	Walpole.
Bertie Tp. Gas & Oil Syndicate	Fisherville	Bertie, (d) Humberstone.
		(c) Willoughby.
Binbrook Gas Co.	Binbrook	Binbrook.
Bliss, D. E.	Flint, Mich., U.S.A.	Middleton.
Brindley & Harper	Bradford, Pa.	Brantford.
Broadway Gas Syndicate (d)	Cayuga	Walpole.
Brownsville-Nelson Co.	703 Capitol Park Bldg., Detroit	Bayham.
Buck, C.S.	Port Rowan	S. Walsingham.
Burchell Nat. Gas & Oil Syndicate	Listowel, R.R. 2	Canboro, Raleigh, Woodhouse.
Canada Cement Co., Ltd.	Montreal, Que.	Wainfleet.
Canadian Nat. Gas Syndicate	Simcoe	Dayham, Moulton.
Canadian Penn. Grade Producers Ltd.	220 Nelson St., Brantford	Onondaga.
Canby, B. F.	Wainfleet	Wainfleet.
Canfield Nat. Gas Co., Ltd., The	Canfield	Nth. Cayuga.
Canfield Gas Syndicate	204-5 Douglas Bldg., Windsor	Nth. Cayuga.
Cartwright, S. E.	1972 Penobscot Bldg., Detroit, Mich.	Walpole.
Central Pipe Line Co., Ltd.	Chatham	Bayham (d), Dereham (d), Houghton, Malahide, Middleton.
		Seneca.
Central Seneca Gas Syndicate	Cayuga	
City Gas Co. of London (b)	215 Dundas St., London	Walpole.
Colbert, M. A.	28 Beech St., Sudbury	Gainsboro, Wainfleet.
Coleman, J. A.	Wellandport	Canboro, Moulton.
Colonial Nat. Gas & Oil Co., Ltd.	Stoney Creek	Dunn.
Columbia Nat. Gas & Oil Co.	515 Pigott Bldg., Hamilton	Rainham.
Comins, H. M.	460 South Saginaw St., Flint, Mich., U.S.A.	Bayham.
Connor & McKechnie	Dunnville	Binbrook.
Continental Gas Corporation	Goderich	Bertie.
Coronation Gas Syndicate	Stevensville	
Culver, M. (a)	Selkirk	
Damstadder, A. A. (c) (d)	Detroit, Mich.	Malden.
Dawson, Ralph	Merlin	Tilbury East.
Dean Gas & Oil Syndicate	Fisherville	Bayham, Middleton.
Delhi Gas Syndicate	Cayuga	Windham.
Dereham Gas & Oil Co., Ltd.	100 Adelaide St. W., Toronto	Oneida, Rainham, Walpole, S. Walsingham.
		Moulton, Oneida, Seneca.
Domestic Gas & Oil Co., Ltd.	36 Toronto St., Toronto	Bayham (d), Binbrook.
Dominion Gas Co., Ltd.	315 Colborn St., Brantford	Caistor, Canboro, Charlotteville, Dereham (d), Delhi, Village, Dunn, Glanford, Houghton, Humberstone, Mersea, Middleton, Moulton, North Cayuga (d), North Dorchester, North Norwich (d), North Walsingham, Oneida, Onondaga, Pt. Dover Village, Port Rowan, Rainham, Raleigh, Romney, Seneca, Sherbrooke, South Cayuga, South Dorchester (d), South Walsingham, Southwold (d), Tilbury, E., Townsend, Wainfleet, Walpole, West Oxford (d), Windham, Woodhouse, Yarmouth (d).

DIRECTORY OF FIRMS—Continued

Natural Gas Industry—Continued

Name	Head office address	Location
ONTARIO—Continued		
Drake & Walker (d).....	Walkerville.....	TOWNSHIP—Colchester.
Dunn Nat. Gas Co., Ltd.....	100 Adelaide St. W., Toronto.....	Sherbrooke.
Dunnville-Detroit Gas Syndicate.....	204-5 Douglas Bldg., Windsor.....	North Cayuga.
East Side Gas Co.....	Lowbanks.....	Sherbrooke.
Economy Nat. Gas Syndicate.....	Stratford.....	Woodhouse.
Elk Producing Co.....	Selkirk.....	Humberstone.
Emerald Gas Syndicate.....	100 Adelaide St. W., Toronto.....	Oneida.
Emerson, H. L. (e).....	Dunnville.....	Canboro, Moulton.
Emerson, L.....	Wainfleet, R.R. 1.....	Wainfleet.
Empire Nat. Gas, Ltd.....	Sterling Tower Bldg., Toronto.....	Walpole, S. Walsingham.
Evans, H. (a).....	Brownsville.....	
Fisherville Gas Co.....	Fisherville.....	Rainham.
Fleet Aircraft Ltd.....	Fort Erie.....	Bertie.
Frontier Gas Syndicate.....	Fisherville.....	Bertie.
Gas Producers Co.....	204-5 Douglas Bldg., Windsor.....	Raleigh.
Gazzo Natural Gas Co.....	45 Regal Rd., Toronto.....	Rainham.
Gifford & Son, A.....	R.R. 2, Cayuga.....	South Cayuga.
Gleney, D.....	Dunnville.....	Canboro.
Grand River Gas & Oil Syndicate.....	Canfield.....	North Cayuga.
Grimsby Nat. Gas Co., Ltd.....	Grimsby.....	Caistor (d), Canboro, Gainsboro.
		Rainham.
Haldimand Gas Syndicate.....	Cayuga.....	Bertie.
Haldimand Natural Gas Syndicate.....	Stevensville.....	Raleigh.
Highbank Oil, Ltd.....	Chatham.....	
High Grade Natural Gas Co., Ltd. (a).....	Chatham.....	Tilbury East.
Hill & Sons, A. W.....	Coatsworth.....	
Hoover, A. E. (a).....	Selkirk.....	
Hoover, A. E. & Donald, T. G. (a).....	Selkirk.....	
Hope Gas Syndicate.....	43 Ontario St., St. Catharines.....	Moulton.
House, C. C. (e).....	Stevensville.....	Berti (d), Humberstone.
Ideal Gas Syndicate.....	Fisherville.....	Rainham.
Jackson & Graft Syndicate.....	Dunnville.....	Crowland.
Jackson, P. L. (e).....	Dunnville.....	Canboro, Moulton, (c)
		North Cayuga.
Jasperson, Bon (e).....	Kingsville.....	South Gosfield, Romney.
Julian, S. (d).....	London.....	Dereham.
Kelly Gas & Oil Syndicate.....	15 Drayton Ave., Toronto.....	Rainham, Walpole.
Kent Gas Co. (d).....	Chatham.....	Raleigh.
Kidd, L. W. (e).....	181 Strathearn Rd., Toronto.....	Bayham, Dereham.
Kindy & Son, D.....	Selkirk.....	Rainham.
Kiser Bros. (a).....	321 Victoria Ave., Chatham.....	
Ladd & Kabana.....	Detroit, Mich. U.S.A.....	Tilbury, East.
Ladd-Knight.....	1672 Penobscot Bldg., Detroit, Mich., U.S.A.....	Walpole.
Ladd-Knight-Medina Nat. Gas Co., Ltd.....	1672 Penobscot Bldg., Detroit, Mich., U.S.A.....	Dover.
Lake Erie Gas Syndicate.....	57 Queen St. W., Toronto.....	Rainham.
Lake Shore Gas & Oil Syndicate (d).....	Stevensville.....	Bertie.
Lake Shore Gas Co. (d).....	Chatham.....	Raleigh.
Lauer, D. G. (a).....	Till-onburg.....	
Leamington, Town of (b).....	Leamington.....	
Lincoln Gas Co. Ltd.....	10 Adelaide St. E., Toronto.....	Caistor, Canboro, Gainsboro.
Lindsay, Wm. B., Estate of.....	c/o Neville B. Lindsay, Canada.....	
	Permanent Bldg., Edmonton, Alta.....	Rainham, Walpole, Cayuga South.
Locators Oils Ltd.....	22 King St. W., Toronto.....	Middleton, N. Walsingham.
Lomac Gas & Oil Co., The.....	Port Stanley.....	Bayham, Cayuga North
Lymburner Bros. & Webber (e).....	Dunnville.....	Rainham, Walpole.
Manufacturers Nat. Gas Co., Ltd (b).....	301 Birks Bldg., Hamilton.....	
McCutcheon, T. J. (a).....	Dunnville.....	Seneca, Walpole.
McKechnie, S. (e).....	Dunnville.....	Canboro.
McKechnie & Hussey.....	Dunnville.....	Walpole.
McKillop Nat. Gas Syndicate.....	Dunnville.....	Nottawasaga.
McLean, M. (c).....	Chatham.....	
McLister, J. J. (a).....	Dunnville.....	
McNinch, S. E. (a).....	Pictou.....	
Mehlenbacher, L. B.....	Cayuga.....	Seneca.
Middleton-Norfolk Gas Co., Ltd.....	Stratford.....	Dereham (d), Middleton.
Middlefield Gas Corp. Ltd.....	73 Adelaide St. W., Toronto.....	North Cayuga, Oneida.
Minnicog Gas Co.....	16549 Woodward Ave., Detroit, Mich.....	North Cayuga.
Mohawk Gas & Oil Syndicate Ltd.....	421 Main St. E., Hamilton.....	Canboro, Oneida, Walpole.
Monarch Gas & Oil Syndicate.....	Fisherville.....	Walpole.
Morningstar, R.....	Stevensville.....	Bertie.
Nagel, E. (a).....	Stevensville.....	
Nelles Corners Gas Syndicate.....	Nelles Corners.....	North Cayuga, Rainham.
New Eden Natural Gas Co., Ltd.....	Tillsonburg.....	Bayham.
New Till-onburg Oil & Gas Co., Ltd.....	26 Adelaide St. W., Toronto.....	Middleton.
Niagara Gas Syndicate.....	Fisherville.....	Bertie.
Niagara Nat. Gas Co., Ltd.....	Suite 2008, 80 Richmond St. W., Toronto.....	Moulton.
Niece, Elmond.....	Lowbanks.....	Sherbrooke.
Norhal Gas & Oil Ltd.....	812 Canada Permanent Bldg., Toronto.....	Walpole.
Norotto Gas Co., Ltd., The (b).....	Norwich.....	
North Cayuga Gas Syndicate.....	Cayuga.....	North Cayuga.

DIRECTORY OF FIRMS—Continued

Natural Gas Industry—Continued

Name	Head office address	Location
ONTARIO—Continued		
North Shore Gas Co.	Selkirk	TOWNSHIP— Rainham.
Nottawa Oil & Gas Co., Ltd.	330 Bay St., Toronto	Onondaga, Rainham, Wainfleet, Walpole. Willoughby.
Noyes, L. A.	Stevensville	Humberstone.
Nugent, C.	Welland Jct.	
Oil Springs Oil & Gas Co., Ltd. (b)	Oil Springs	
Oxford Pipe Line Co., Ltd. (b) (f)	100 Adelaide St. W., Toronto	
Palmer, J.	Wainfleet	Wainfleet.
Patterson Gas Co., Ltd., W.C.	Box 914, Jamestown, N. Y.	Bayham, Crowland, Dere- ham, Dunn, Humber- stone, North Cayuga, Rainham, Walpole, Willoughby (d).
Patterson & Culver (a)	Dunnville	
Perdue, J. (e)	Chatham	Dereham (d), Mosa (d).
Perkins, J. E. (a)	Fisherville	
Petrol Gas & Oil Co., Ltd.	Toronto	Dover (e) (d), Oneida, Onondaga, Tuscarora. Hallowell.
Pictou Gas Co.	Pictou	Dereham.
Pine Ridge Gas Co.	Port Stanley	Oneida (d), Onondaga, Seneca (d).
Port Colborne-Welland Gas Co. (e)	Port Colborne	Canboro, Mersea.
Povec Gas Syndicate	Tillsonburg	Dover.
Prairie Gas & Oil Co., Ltd.	350 Bay St., Toronto	Bertie, Crowland, Hum- berstone, Willoughby.
Provincial Gas Co., Ltd.	24 Jarvis St., Fort Erie, N.	Rainham, Seneca. Walpole.
Rainham Gas Syndicate	Cayuga	Dereham.
Reicheld, F. W. (d)	Jarvis	Canboro.
Reid-Adams Development Co.	110 Dundas St., London	Moulton.
Rieker & Son, A. (e)	Canboro	Oneida.
Riley, J. V.	Simcoe	Romney, Tilbury East, Wainfleet.
River Valley Nat. Gas Syndicate	18 Hillsdale Ave. E., Toronto	North Cayuga, Oneida.
Romney Gas & Oil Co., Ltd.	18 Toronto St., Toronto	Bertie, Dereham (d), Dover, Middleton, Raleigh (d).
Rossmore Exploration Ltd.	80 Richmond St. W., Toronto	Bertie.
Roth, F. & H. (e)	Dunnville	Tilbury, East.
Rowe, E. P. (e)	350 Bay St., Toronto 2	Walpole.
Royal Gas Syndicate	Stevensville	Enniskillen, Sarnia.
Salina Gas Co., Ltd.	Chatham	Raleigh.
Sandusk Gas Syndicate	Fisherville	Seneca.
Sarnia Oil & Gas Co., Ltd.	350 Bay St., Toronto	Canboro.
Shell Oil & Gas, C. H.	Chatham	Bertie.
Shelton, S. F.	York	Bertie.
Shepherd, E.	Canboro	Humberstone.
Sherk, Mrs. J. M.	Ridgeway	Oneida.
Sherk, Bert.	Stevensville	Bertie.
Sherk, Perry	Sherkston	Bertie (c), Humberstone.
Shurr & Shank	Selkirk	Moulton.
Sider, A. & J.	Stevensville	Walpole.
Sider, N.	Sherkston	Rainham, Walpole.
Smith & Ehde (e)	Lowhanks	Bertie.
Springvale Gas Oil Co.	Hagersville	Townsend.
Standard Gas & Oil Syndicate	Fisherville	Walpole.
Star Gas Syndicate	Stevensville	Bertie.
Stays, H. C.	Brantford	Walpole.
Sterling Gas Co., Ltd.	7 Quebec St. W., Guelph	Bertie.
Stevenson Nat. Gas & Fuel Co.	Stevensville	Rainham, Walpole.
Stewart & Stewart (e)	Jarvis, R.R. 3	Dover, Raleigh.
Staver, F. H. & Ass'n. (e)	Chatham	Moulton.
Stromwell Syndicate	Tillsonburg	
Stuhle, H. H. (a)	225 Grand Ave. E., Chatham	Canboro.
Sundy Gas Co.	Dunnville	Rainham.
Superior Gas Syndicate	Fisherville	Rainham.
Sweets Corners Gas Syndicate	Fisherville	
Tanner, F. O.	General Motors Bldg., Detroit, Mich.	North Cayuga, Oneida.
Tillsonburg, O. & G. Co.	224 Carleton St., Toronto	Middleton.
Treleven, A.	98 Central Ave., London	Dereham.
Union Gas Co. of Canada Ltd.	Chatham	Canboro, Cayuga North (d), Cayuga South, Chatham, Dawn, Dover, Dunn, Harwich (d), Malahide (d), Oneida (d), Orford (d), Rainham, Raleigh, Romney, Seneca, Til- bury East, Walpole (d), Woodhouse.
United Gas & Fuel Co. of Hamilton, Ltd. (b)	82-84 King St. E., Hamilton	
Victoria Gas Co.	Dunnville	Rainham, Walpole.
Volcanic Gas & Oil Co., Ltd., (d)	510 Royal Bk. Bldg., Toronto	Colchester, Malden.

DIRECTORY OF FIRMS—Continued

Natural Gas Industry—Continued

Name	Head office address	Location
ONTARIO—Concluded		
Walpole Gas Syndicate.....	Cayuga.....	TOWNSHIP— Bayham (d), Dereham (d), Middleton (d), Walpole (d), Walsing- ham S. Middleton, Townsend, Woodhouse. Bertie. Crowland.
Walter Gas Syndicate, Ltd. (e).....	Simcoe.....	Middleton, Townsend, Woodhouse.
Welland County Gas Syndicate.....	Stevensville.....	Bertie.
Welland Dairy Ltd.....	Welland.....	Crowland.
Wentworth Gas Co., Ltd. (b).....	82-84 King St. E., Hamilton.....	Bayham, Canboro, Cayu- ga North, Dereham, Dunn.
Western Ontario Nat. Gas Co., Ltd.....	100 Adelaide St. W., Toronto.....	
Willits, G. E. (a).....	Bothwell.....	Mosa, Romney.
Wood, R.....	61 Inshes Ave., Chatham.....	
York Nat. Gas Syndicate.....	Sterling Tower Bld., Toronto.....	Oneida, Seneca.
ALBERTA—		
Advance Oil Co., Ltd.....	200 Leeson-Lineham Block, Calgary.....	Turner Valley.
Alberta Clay Products Co.....	Medicine Hat.....	Medicine Hat.
Anglo Canadian Oil Co., Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Argus Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Arrow Oil Co., Ltd.....	304 Toronto General Trusts Bldg., Calgary.....	Turner Valley.
Associated Oil & Gas Co., Ltd.....	200 Leeson-Lineham Block, Calgary.....	Turner Valley.
Barsac Royalties Ltd.....	Toronto General Trusts Bldg., Calgary.....	Turner Valley.
B. and B. Royalties Ltd.....	232 Loughheed Bldg., Calgary.....	Turner Valley.
Bow Island, Town of, (b).....	Bow Island.....	
British American Oil Co., Ltd. (g).....	Royal Bank Bldg., Toronto, Ont.....	Bassano.
Calgary Power Co., Ltd.....	Insurance Exchange Bldg., Calgary.....	Medicine Hat.
Canadian Pacific Railway Co.....	Medicine Hat.....	
Canadian Western Natural Gas, Light, Heat and Power Co., Ltd.....	215 Sixth Ave. W., Calgary.....	Brooks.
Canadian Western Power & Fuel Co., Ltd.....	Redcliff.....	Redcliff.
Coronation Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Coutts Pipe Line Co., Ltd.....	201 Lancaster Bldg., Calgary.....	Turner Valley.
D. & D. Royalties, Ltd.....	Toronto General Trusts Bldg., Calgary.....	Turner Valley.
Dina Oil and Refining Co., Ltd.....	Lloydminster, Sask.....	Dina.
Dominion Glass Co., Ltd.....	1111 Beaver Hall Hill, Montreal, Que.....	Turner Valley.
East Crest Oil Co., Ltd.....	400 Maclean Block, Calgary.....	Turner Valley.
Extension Oil Co., Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Firestone Petroleum Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Footfills Oil and Gas Co., Ltd.....	606 Second St. W., Calgary.....	Turner Valley.
Foundation Petroleum Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Frontier Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Gas and Oil Products, Ltd. (g).....	301 Lancaster Bldg., Calgary.....	
Gold Standard Oils Ltd.....	Wainwright.....	Wainwright.
Granville Oils Ltd.....	638 Columbia St., New Westminster, B.C.....	Turner Valley.
Guardian Oil Co., Ltd. (c).....	Grande Prairie.....	Pouce Coupé.
Gunderson Brick & Coal Co., Ltd.....	Redcliff.....	Redcliff.
Highwood-Sarcee Oils, Ltd.....	614 Lancaster Bldg., Calgary.....	Turner Valley.
Home Oil (Alberta) Ltd.....	304 Pacific Bldg., Vancouver, B.C.....	Turner Valley.
Hudson's Bay Oil & Gas Co., Ltd.....	79 Main St., Winnipeg, Man.....	Viking.
Hylo Oils Ltd.....	120 7th Ave. W., Calgary.....	Turner Valley.
Independent Royalties Ltd.....	403 Lancaster Bldg., Calgary.....	Turner Valley.
Maple Leaf Milling Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Maple Leaf Oil Co., Ltd.....	708 Stock Exchange Bldg., Vancouver, B.C.....	Medicine Hat.
Medicine Hat Brick & Tyle Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Medicine Hat, City of.....	Medicine Hat.....	Medicine Hat.
Mercury Oils Ltd.....	301 Lancaster Bldg., Calgary.....	Turner Valley.
Miracle Oils Ltd.....	301 Lancaster Bldg., Calgary.....	Turner Valley.
Model Oils Ltd.....	201 Lancaster Bldg., Calgary.....	Turner Valley.
Model Spooner Syndicate.....	717 Lancaster Bldg., Calgary.....	Turner Valley.
Monarch Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
National Petroleum Corp., Ltd.....	56 Church St., Toronto, Ont.....	Turner Valley.
Newfold Royalties Ltd.....	232 Loughheed Bldg., Calgary.....	Turner Valley.
Northwest Co., Ltd.....	56 Church St., Toronto, Ont.....	Turner Valley.
Northwestern Utilities Ltd.....	10124 104th St., Edmonton.....	Viking.
Ogilvie Flour Mills Co., Ltd.....	Medicine Hat.....	Medicine Hat.
Oil Investors Ltd.....	1005 9th Ave. E., Calgary.....	Turner Valley.
Oil Ventures Ltd.....	600 Lancaster Bldg., Calgary.....	Turner Valley.
Pacific Petroleum, Ltd.....	209 6th Ave. W., Calgary.....	Turner Valley.
Prairie Royalties.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Redcliff Premier Brick Co., Ltd.....	Redcliff.....	Redcliff.
Redcliff Pressed Brick Co.....	Redcliff.....	Redcliff.
Royal Canadian Oils Ltd.....	403 Lancaster Bldg., Calgary.....	Turner Valley.
Royal Crest Petroleum Ltd.....	232 Loughheed Bldg., Calgary.....	Turner Valley.
Royalite Oil Co., Ltd.....	606 Second St. W., Calgary.....	Turner Valley.
Share Royalties Ltd.....	61 Canada Life Bldg., Calgary.....	Turner Valley.
Spy Hill Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Sterling Royalties Ltd.....	105 Bank of Commerce Chambers, Calgary.....	Turner Valley.
Suffield, Village of.....	Suffield.....	Suffield.
Sunburst Oil Co., Ltd.....	800 Lancaster Bldg., Calgary.....	Turner Valley.
Sundance Royalties Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.

DIRECTORY OF FIRMS—Continued

Natural Gas Industry—Concluded

Name	Head office address	Location
ALBERTA—Concluded		FIELD—
Sunset Oils Ltd.....	302 Toronto General Trusts Bldg., Calgary..	Turner Valley.
Three Point Petroleum Ltd.....	232 Lougheed Bldg., Calgary.....	Turner Valley.
Turner Valley Royalties Ltd.....	232 Lougheed Bldg., Calgary.....	Turner Valley.
Twin Valley Oil Co., Ltd.....	304 Toronto General Trusts Bldg., Calgary..	Turner Valley.
Vanalta Limited.....	Granville Island, Vancouver, B.C.....	Red Coulee.
Wainwright Gas Co., Ltd (b).....	36 Dominion Bank Bldg., Edmonton.....	
Westflank Oil Co., Ltd.....	902 Lancaster Bldg., Calgary.....	Turner Valley.
Westside Royalties Ltd.....	232 Lougheed Bldg., Calgary.....	Turner Valley.
Wetaskiwin, City of.....	Wetaskiwin.....	Wetaskiwin.
Winalta Royalties Ltd.....	301 Lancaster Bldg., Calgary.....	Turner Valley.
NORTHWEST TERRITORIES—		FIELD—
Northwest Co., Ltd.....	56 Church St., Toronto, Ont.....	Fort Norman.

OTHER NON-METAL MINING INDUSTRIES

DIRECTORY OF FIRMS—Continued

Asbestos Mining Industry

Name	Head office address	Location
QUEBEC—		PLANT—
Asbestos Corporation Ltd.....	Canada Cement Building, Montreal.....	Thetford Mines, Black Lake, Coleraine.
Bell Asbestos Mines Ltd.....	Thetford Mines.....	Thetford Tp.
Canadian Johns-Manville Co., Ltd.....	Sun Life Building, Montreal.....	Asbestos.
Jacobs, J. A. (a).....	1410 Stanley St., Montreal.....	Thetford Mines.
Johnson's Company.....	Thetford Mines.....	Thetford Mines, Coleraine.
Nicolet Asbestos Mines Ltd.....	820 Transportation Bldg., Montreal.....	Norbestos.
Quebec Asbestos Corp. Ltd.....	East Broughton Station.....	East Broughton Sta.
ONTARIO—		PLANT—
Rahn Lake Mines Corp., Ltd.....	19 Melinda Street, Toronto.....	Bannockburn Tp., Matachewan Dist.

(a) Carried on exploration or development work only (Asbestos Crude & Fibre Mines Ltd.).

Feldspar and Quartz Mining Industry

(a) shipped silica only.

(b) operate a milling plant.

(c) shipped scapolite.

(d) shipped garnet sand.

(e) shipped grinding pebbles.

NOVA SCOTIA—		MINE OR MILL—
Nairn, J. S. (a).....	Sydney 24 Whitney Ave.,.....	Leitches Creek.
QUEBEC—		MINE OR MILL—
Barr, Walter.....	Beachburg, Ont.....	Aberford Tp.
Bigelow, T. (a).....	Poupore.....	Poupore.
Bigelow, Gordon and Parcher, A.....	Glen Almond.....	Derry Tp.
Bigelow, Robert.....	Buckingham.....	Derry Tp.
Bon Ami Ltd.....	13719 Notre Dame St. E., Montreal.....	Buckingham Tp.
Cameron, Wm.....	Buckingham.....	Buckingham Tp.
Cameron, R. L.....	Buckingham.....	Buckingham Dist.
Canadian Flint & Spar Co., Ltd. (b).....	140 Wellington St., Ottawa, Ont.....	Buckingham.
Canadian Kaolin Silica Products Ltd. (a) (b).....	1007 Canada Cement Bldg., Montreal.....	St. Remi d'Amherst.
Canadian Carborundum Co., Ltd. (a).....	Box 57, Niagara Falls, Ont.....	St. Canut.
Constantineau, Leon (c).....	Pointe aux Chênes.....	Argenteuil Co.
Cosgrove, J. W. (a).....	Buckingham.....	Buckingham Tp.
Donaldson, Robert J.....	Glen Almond.....	Buckingham Tp.
Evans, W. H. and McDonnell, B. A.....	Buckingham.....	Derry Tp.
Grenat Canada Ltd. (d).....	4203 rue Brebeuf.....	Joly Tp.
Hill, W. A.....	Glen Almond.....	Buckingham.
McDonnell, B. A.....	Buckingham.....	Derry Tp.
Montpetit, Euclide (a).....	Melocheville.....	Melocheville.
Morin, A. H.....	Buckingham.....	Glen Almond.
Newton, Alfred (a).....	Buckingham.....	Glen Almond.
Ottawa Silica and Sandstone Ltd. (a).....	East Templeton.....	Hull Co.
Parcher, Maggie.....	Glen Almond.....	Derry Tp.
Pedneaud, Louis.....	Buckingham.....	Glen Almond.
Perkins Mining Co.....	Gatineau Pointe.....	Derry and Porland E.Tps.
Stewart, Wm. (a).....	Buckingham.....	Buckingham Dist.
Thompson, C. (a).....	Glen Almond.....	Glen Almond.
Warwick, Wm. (a).....	Glen Almond.....	Buckingham Tp.
Wallingford & Evans.....	Gatineau Pointe.....	Buckingham Dist.
ONTARIO—		
Bathurst Feldspar Mines Ltd.....	Room 508, 21 King St. E., Toronto.....	Lanark Co.
Cameron, Wallace B.....	Madawaska.....	Madawaska.
Craig, T. H.....	Box 302, Perth.....	Lanark Co.
Dominion Mines & Quarries Ltd. (a) (b).....	Canada Life Bldg., Toronto.....	Killarney.
Evans, W. H.....	Perth.....	Lanark Co.
Frontenac Floor & Wall Tile Co. Ltd. (b).....	Kingston.....	Kingston.
Gole, John G.....	Room 54, 18 Toronto St., Toronto.....	Nipissing Dist.
Magnetawan Feldspar Mining Syndicate Ltd.....	64 Kent Road, Toronto.....	Parry Sound Dist.
Meeks, Leonard.....	Verona.....	Bell Rock.
MacDonald, P.....	Hybla.....	Hybla.
Wood, W. A.....	258 Kensington Ave. N., Hamilton.....	Hastings Co.
Wright & Co. (a).....	960 Queen St., Sault Ste. Marie.....	Algoma Central R.R.
MANITOBA—		
Winnipeg River Tin Mines Ltd.....	1139 McDermot Ave., Winnipeg.....	Pointe du Bois.
SASKATCHEWAN—		
Davis, Norman B. (e).....	207 Victoria Bldg., Ottawa, Ont.....	Gouverneur.

DIRECTORY OF FIRMS—Continued

Nepheline Syenite

Name	Head office address	Location
ONTARIO— Canadian Flint & Spar Co., Ltd.	140 Wellington St., Ottawa.....	MINE OR MILL— Dungannon Tp.
American Nepheline Corp.	Lakefield.....	Metheun Tp.
Temagami Development Co. Ltd.	c/o B. W. Watkins, Newtonbrook.....	Dungannon Tp.

Gypsum Mining Industry

NOVA SCOTIA— National Gypsum Co., (Can.) Ltd.	192 Delaware Ave., Buffalo, N.Y., U.S.A.	QUARRY LOCATION Dingwall, Cheticamp and Walton.
Canadian Gypsum Co., Ltd.	170 Bloor St. W., Toronto, Ont.	Wentworth.
The Connecticut Adamant Plaster Co.	10 River St., New Haven, Conn., U.S.A.	Cheverie.
Windsor Plaster Co., Ltd.	Windsor, N.S.	Brooklyn, Hants Co.
Victoria Gypsum Co., Ltd.	Little Narrows, N.S.	Little Narrows.
Gypsum, Lime and Alabastine, Canada, Limited.	Paris, Ont.	Baddeck Bay.
NEW BRUNSWICK— Canadian Gypsum Co., Ltd.	170 Bloor St. W., Toronto, Ont.	QUARRY— Hillsborough.
Fraser, Donald.	Plaster Rock.	Plaster Rock.
ONTARIO— Canadian Gypsum Co., Ltd.	170 Bloor St. W., Toronto, Ont.	QUARRY— Hagersville.
Gypsum, Lime and Alabastine, Canada, Ltd.	Paris.	Caledonia.
MANITOBA— Gypsum, Lime and Alabastine, Canada, Ltd.	Paris, Ont.	QUARRY— Gypsumville.
Western Gypsum Products Ltd.	503 McArthur Bldg., Winnipeg.	Amaranth.
BRITISH COLUMBIA— Gypsum, Lime and Alabastine, Canada, Ltd.	Paris, Ont.	QUARRY— Falkland.
Rogers and Little (a).	Knutsford.	Knutsford.
Summit Line Works (x).	Box 273, Lethbridge, Alta.	Fort Steele, M.D.

(a) Ship gypsite.

(x) Did not ship in 1940.

Iron Oxides Mining Industry

QUEBEC— Argall, Thos. H. (a).	La Pointe du Lac.	PLANT— La Pointe du Lac.
Girardin, Chas. D. (a).	Yamachiche.	Almaville and Les Forges.
Mauricity Oxide Co. (a).	Grand Mère.	St. Adelphe.
Chapman, J. E. (c).	Box 439, Hawkesbury, Ont.	Chénéville.
Sherwin-Williams Co. of Canada Ltd. (b).	2875 Centre St., Montreal.	Red Mill.
BRITISH COLUMBIA— Davidson, J. G. (a).	2640 Prospect Ave., La Crescenta, California.	PLANT— Alta Lake.
McDonald, R. W. (c).	123 Grizzly St., Banff, Alta.	Wandermere Dist.

(a) Shipped crude material.

(b) Shipped refined (calcined.)

(c) Did not ship in 1940.

Mica Mining Industry

(x) Active, but no shipments made.
(b) Operates a grinding mill.(a) Market dressed mica.
(†) Mines muscovite mica.

QUEBEC— Ahearn, W.	538 MacLaren St., Ottawa, Ont.	MINE OR PLANT— Hull Tp.
Alie, Rudolph.	Maniwaki.	Egan Tp.
Bigras, E. (a).	Notre Dame du Laus.	Wells Tp.
Biglow, E.	Kilmar.	Grenville.
Blood, A. P. (a).	c/o A. O. Schoonmaker Insulation Co., 635 Greenwich St., New York, N.Y.	Denholm Tp.
Blackburn Bros. Ltd. (a) (b).	Blackburn Bldg., Ottawa, Ont.	Cantley and Perkins.
Boisvert, Ubald (a).	10 St. James St. W., Montreal.	Wells Tp.
Cyr, Georges.	112 St. Laurent St., Hull.	Papineau Co.
Cyr, Isidore (a).	Val-des-Bois.	Hull (dressing plant)
Cross, W. C. (a).	Bridge St., Hull.	Grenville.
Chenier, Z. E. (a).	Rockland, Ont.	
Carman, O.	Farm Point.	Hull Tp.
Cross, Stephen, H.	Farm Point.	Gleneagle Tp.
Cross, Carson (a).	Gleneagle.	St. Michel des Saints.
Dwyer, C. J. (†).	330 Christin Place, Montreal.	Denholm Tp.
Eriksen, Erik J. (a).	Alcove.	Grandes Bergeronnes Tp.
Enterprises Equitables Ltée.	70 rue St. Paul, Quebec.	Wells Tp.
Gauthier, J. (a).	Box 226, Buckingham.	

DIRECTORY OF FIRMS—Continued

Mica Mining Industry—Concluded

Name	Head office address	Location
QUEBEC—Concluded		
Gauthier, J. F.	Jonquière.	MINE OR PLANT— Jonquière Tp.
Lake St. Marie Synd. (a)	c/o J. W. Glover, 13 Lakeview Terrace Ot- tawa, Ont.	Hincks Tp.
Larouche, L. (†)	Grande Bergeronnes.	Bergeronnes Tp.
Lalonde, N.	Notre Dame de la Salette.	
Larrie, Alfred (a) (†)	Jonquière.	Bergeronnes Tp.
Martin, A. G.	Cantley.	Cantley.
Mathe, J. F. (a)	St. Pierre de Wakefield.	W. Portland Tp.
McNeely, James (x)	114 Harmer Ave., Ottawa, Ont.	Carwood Tp.
McGlashen, R. J. (a)	190 Montcalm St., Hull.	
McLean, F. A. (a)	374 Gilmour St., Ottawa, Ont.	E. Portland Tp.
McLean, D. V. Interest Ltd. (a)	Room 202, 1111 Beaver Hall Hill, Montreal.	W. Portland Tp.
Mallon, O. (a)	Poltimore.	W. Portland Tp.
Poirier, Adélar (a)	Wilsons Corners.	Wilsons Corners.
Prud'homme, Oscar.	Perkins Mills.	Templeton Tp.
St. Lawrence Mica Corp. Ltd. (a)	105 Côte de la Montagne, Quebec.	Montmorency.
Seguin, E. R. (a)	Buckingham.	Wells Tp.
Sargeant, F. A. Pte. (C.A.S.F.) (a)	Wilsons Corners.	Hull Dist.
Simard, Eug. (†) (a)	Grande Bergeronnes.	Bergeronnes Tp.
Simard, Henry (a)	Grande Bergeronnes.	Bergeronnes Tp.
Sparks, W. M. E. (a)	Woodroffe, Ont.	Hincks Tp.
Toutloff, Frank.	Pointe Gatineau.	
Tarrad & Trepanier.	178 Carling Ave., Ottawa, Ont.	
Trudeau, Victor.	Old Chelsea.	
Wallingford, Arthur (Perkins Mining Co.) (a)	Pointe Gatineau.	Hull Dist.
Wallingford, Edward (a)	Perkins.	Templeton Tp.
Wallingford, John (a)	Perkins Mills.	N. Templeton Tp.
Wilson, Neil (a)	Cantley.	E. Hull Tp.
ONTARIO—		
Brown and Fahey, J. P.	Elgin.	MINE OR PLANT— Elgin.
Buchanan, Geo.	Stanleyville.	
Haughian, Frank.	Perth.	Burgess Tp.
Kingston Mica Mining Co., Ltd. (a)	Godfrey.	Bedford Tp.
Kent Bros. (a)	Gore St., Kingston.	Kingston.
Lee, W. W. (a)	Perth Road.	Bok Lake.
Loughborough Mining Co., Ltd. (a)	Sydenham.	Sydenham.
O'Connor, W. J. (a)	Lombardy.	N. Burgess Tp.
Orser, C. C. (a)	Verona.	Olden Tp.
Orser, S. H. (a)	Verona.	Verona.
Split Mica Mining Synd., Ltd. (x)	121 Elmer Ave., Toronto.	Loughborough Tp.
Watts, R. W.	Perth.	Perth.
Wallingford, Arthur.	Pointe Gatineau, Que.	N. Burgess Tp.

Salt Industry

NOVA SCOTIA—		
Malagash Salt Co. Ltd.	196 Provost St., New Glasgow.	PLANT— Malagash.
ONTARIO—		
Brunner, Mond Canada, Ltd.	Canadian Bank of Commerce Bldg., Toronto	PLANT— Amherstburg.
Canadian Industries Limited.	P. O. Box 10, Montreal, Que.	Windsor.
Goderich Salt Co., Ltd.	Goderich.	Goderich.
Sifto Salt Co., Ltd.	606 Cathcart St., Montreal, Que.	Sarnia.
Warwick Pure Salt Co., Ltd.	R. R. 5, Watford.	Lambton Co.
Western Canada Flour Mills Co., Ltd.	287 MacPherson Ave., Toronto.	Goderich.
MANITOBA—		
Neepawa Salt Ltd.	P. O. Box 10, Montreal Que.	PLANT— Neepawa.
ALBERTA—		
Industrial Minerals Ltd.	423 Canada Cement Bldg., Montreal, Que.	PLANT— Waterways.

Talc and Soapstone Industry

QUEBEC—		
Baker Mining and Milling Co., Ltd.	Highwater.	PLANT— Potton Tp.
Broughton Soapstone and Quarry Co., Ltd.	Broughton Station.	Broughton Tp.
Fortin, Charles.	Robertsonville.	Thetford Tp.
Labonte, W. (x)	77 Notre Dame, Thetford Mines.	Thetford Tp.
Pharo, L. C.	Thetford Mines.	Leeds Tp.
ONTARIO—		
Canada Talc Ltd.	Madoc.	PLANT— Hastings Co.
Trent Mining Synd. Ltd.	213 Dundas St. E., Trenton.	Huntingdon Tp.
BRITISH COLUMBIA—		
Fairey and Co. (x)	661 Taylor St., Vancouver.	PLANT— Anderson Lake.

(x) No production reported in 1940.

MISCELLANEOUS NON-METAL MINING INDUSTRIES, 1940

Barite

* Active but not producing.

Name	Head office address	Location
NOVA SCOTIA— North American Mining & Chemical Corp., Ltd. Springer Sturgeon Gold Mine Ltd.*.....	4 Poplar St., Halifax..... Room 1207, 67 Yonge St., Toronto, Ont.....	PLANT Lake Ainslie. Walton.
ONTARIO— Meen, Benjamin.....	Room 607, 67 Yonge St., Toronto, Ont.....	Tionaga, Ont.

Beryl

ONTARIO— Canadian Beryllium Mines & Alloys Ltd.*....	901 Royal Bank Bldg., Toronto.....	Renfrew Co.
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Diatomite

NOVA SCOTIA— International Diatomite Industries Ltd..... Wightman, E. W.....	Tatamagouche..... Smith's Cove.....	East New Annan. Digby Co.
BRITISH COLUMBIA— Fairey & Company.....	661 Taylor St., Vancouver.....	Cariboo District.

Fluorspar

NOVA SCOTIA— North American Mining & Chemical Corp., Ltd.	4 Poplar St., Halifax.....	Lake Ainslie.
ONTARIO— Clark, Wm. E..... Dominion Fluorspar Co., Ltd..... Moirs Fluorspar Mining Synd., Ltd..... Stoklosar, Chas. A.....	Harcourt..... Room 712 Royal Bank Bldg., Montreal, Que.. Madoc..... Box 198, Madoc.....	Cardiff Tp. Madoc Tp. Huntingdon Tp. Madoc Tp.

Garnets

QUEBEC— Grenat Canada Ltd.....	4203 Brebœuf St., Montreal.....	Joly Tp.
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Graphite

ONTARIO— Black Donald Graphite Co., Ltd.....	Calabogie.....	Brougham Tp.
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Lithium Minerals

MANITOBA— *The Lithium Corp. of Can. Ltd.....	403 Avenue Bldg., Winnipeg.....	Bernie Lake.
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Magnesitic Dolomite

QUEBEC— Canadian Refractories Ltd..... International Magnesite Co., Ltd.....	1050 Canada Cement Bldg., Montreal..... Calumet.....	PLANT— Kilmar. Harrington Tp.
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Magnesium Sulphate

BRITISH COLUMBIA— Riley, W. P.*.....	116 Market Ave., Winnipeg, Man.....	Ashcroft.
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MISCELLANEOUS NON-METAL MINING INDUSTRIES—Continued

Mineral Waters

* Active but not producing.

Name	Head office address	Location
QUEBEC—		
Abenakis Springs Co.	St. François du Lac.	PLANT— Yamaska Co.
Eau mineral Etoile.	Ste. Geneviève de Batiscan.	Ste. Geneviève de Batiscan.
Embouteillage d'eau Gazeuse.	St. Hyacinthe.	Yamaska Co.
Gurd, Charles & Co., Ltd.	1016 Bleury St., Montreal.	Varennes.
La Cie d'eau Minérale.	St. Hyacinthe.	St. Hyacinthe.
La Cie Embouteillage St. Laurent.	65 rue St. Pierre.	Rapid Plat Rd.
MacPeak, T. H.	264 Hospital St., Montreal.	Canton de la Salle.
Pellerin, A.	St. Barnabé Nord.	St. Barnabé Nord.
Radnor Mineral Water Springs.	St. Maurice.	St. Maurice.
Source Coulombe.	L'Epiphanie.	L'Epiphanie.
Usine d'Embouteillage Maski.	St. Justin.	St. Justin.
ONTARIO—		
Belleville Aqua Vitae Co., Ltd.	201 McDonald Ave., Belleville.	Thurlow Tp.
Boyd, T. R.	Carlsbad Springs.	Carlsbad Springs.
Gurd, Charles & Co., Ltd.	1016 Bleury St., Montreal, Que.	Caledonia Springs.
Renaud, Victor.	Blackburn.	Blackburn.

Natural Abrasives (Grindstones, etc.)

NOVA SCOTIA—		
Chaldercott, Guy (Mic Mac Quarry)	Edgerton.	Merigomish Harbour.
NEW BRUNSWICK—		
Read, H. C. (Read Stone Co.)	Stonehaven.	Stonehaven.
SASKATCHEWAN—		
Davis, N. B. (†)	207 Victoria Bldg., Ottawa, Ont.	Gouverneur.

Phosphate

QUEBEC—		
Bigelow, R.	Buckingham.	Gatineau—Lièvre Dist.
Bigelow, S.	Glen Almond.	Gatineau—Lièvre Dist.
Cross, W. C.	Hull.	Gatineau—Lièvre Dist.
Hart, R.	La Salette.	Gatineau—Lièvre Dist.
Osler, C. E.	Wilson's Corners.	Gatineau—Lièvre Dist.
Poirier, C.	Wilson's Corners.	Gatineau—Lièvre Dist.
Poirier, H.	Wilson's Corners.	Gatineau—Lièvre Dist.
Poulin, Jos.	St. Lambert.	Gatineau—Lièvre Dist.
Stewart, Wm.	Buckingham.	Gatineau—Lièvre Dist.
Wallingford, Ed.	Perkins.	Gatineau—Lièvre Dist.
Wilson, N.	Cantley.	Gatineau—Lièvre Dist.

†Shipped grinding pebbles.

Silica Brick

NOVA SCOTIA—		
Dominion Steel & Coal Corp., Ltd.	Sydney.	Sydney.
ONTARIO—		
Algoma Steel Corp., Ltd.	Sault Ste. Marie.	Sault Ste. Marie.

Sodium Carbonate

BRITISH COLUMBIA—		
Bishop, Viola C.	Chasm P.G.E.R.R.	Chasm.
Davison, E. C.	70 Mile P.G.E.R.R.	70 Mile.
Engman, F. W.	70 Mile P.G.E.R.R.	70 Mile.

MISCELLANEOUS NON-METAL MINING INDUSTRIES—Concluded

Sodium Sulphate

* Active but not producing.

Uame	Head office address	Location
SASKATCHEWAN—		PLANT—
Alexander, W. R.....	Viscount.....	Berry Lake.
Hoseshoe Lake Mining Co., Ltd.....	Ormiston.....	Ormiston.
Mellor, John F.....	Alsask.....	Alsask.
Midwest Chemicals Limited.....	Palo.....	Whiteshore Lake.
Natural Sodium Products Limited.....	Bishopric.....	Frederick Lake.
ALBERTA—		
Buschert, Iven.....	Cereal.....	Cereal.

Sulphur-Pyrites

QUEBEC—		
Aldermac Mines Ltd. (a).....	941 Dominion Square Bldg., Montreal.....	Rouyn Dist.
Noranda Mines Ltd. (a).....	Royal Bank Bldg., Toronto, Ont.....	Noranda.
ONTARIO—		
International Nickel Co. of Canada, Ltd. (b)..	Copper Cliff.....	Copper Cliff.
BRITISH COLUMBIA—		
Consolidated Mining & Smelting Co. of Can- ada, Ltd. (b)	Trail.....	Trail.
Britannia Mining & Smelting Co., Ltd. (a)....	Britannia Beach.....	Britannia Beach.
Northern Pyrites Ltd.*.....	744 W. Hastings St., Vancouver.....	Skeena M.D.

(a) Produce by-product iron pyrites.

(b) Salvage sulphur from smelter gases.

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

PORTLAND CEMENT INDUSTRY

Name	Head office address	Location
QUEBEC— Canada Cement Co., Ltd.	Box 290, Station B, Montreal	PLANT— Hull and Montreal East.
ONTARIO— Canada Cement Company Ltd. St. Marys Cement Co., Ltd.	Box 290, Station B, Montreal, P.Q. 357 Bay Street, Toronto	PLANT— Belleville, Lakefield (x), and Port Colborne. St. Marys.
MANITOBA— Canada Cement Company Ltd.	Box 290, Station B, Montreal, P.Q.	PLANT— Fort Whyte and Steep Rock.
ALBERTA— Canada Cement Company, Ltd.	Box 290, Station B, Montreal, P.Q.	PLANT— Exshaw.
BRITISH COLUMBIA— British Columbia Cement Co., Ltd.	805 Government St., Victoria	PLANT— Bamberton and Tod Inlet

(x) Idle in 1939.

DOMESTIC CLAY PRODUCTS INDUSTRY

List of Operators Shipping Brick, Tile, Sewer pipe, etc., Made from Domestic Clays, 1940

NOVA SCOTIA— Brooks, Stephen, & Sons (a) MacIntyre, A. D. (a) Miller, Archie E. Shaw, L. E., Ltd. Standard Clay Products Ltd.	Box 159, New Glasgow Sydney Elmsdale 8 Prince St., Halifax St. Johns, P.Q.	PLANT— New Glasgow. Sydney. Lantz Siding. Lantz Siding. New Glasgow.
NEW BRUNSWICK— Ryan, M., & Son, Ltd. Shaw, L. E. Ltd. (a) Tondreau, Adelard.	Fredericton 8 Prince St., Halifax, N.S. Bathurst	PLANT— Fredericton. Chipman. Bathurst.
QUEBEC— Ascot Tile & Brick Co., Ltd. Begin, Olivier Canada China Clay Ltd. Castonguay, Hubert Champlain Brick Ltd. Citadel Brick Ltd. Cote, Albert Crite, Freddy Desmarais, S. E. & Co. Duquette, Isidore Gaulin, E. Hodgins, David T. LaPrairie Co., Inc. Lotbiniere Brick Co. Montreal Terra Cotta Ltd. Potvin, Alphonse St. Lawrence Brick Co., Ltd. Scott Brick Co. Standard Clay Products Ltd. (a) Tremblay, Jules R.	Ascot Corner R. R. 1, Petite Rivière St. Remi d'Amherst Deschailions 323 Blvd. Charest, Quebec 14 St. Joseph St., Quebec Victoriaville Box 2246, St. Tite Richmond Box 626, East Angus Princeville Shawville 660 St. Catherine St. W., Montreal Deschailions 1010 St. Catherine St. W., Montreal Deschailions 1010 St. Catherine St. W., Montreal Scott Junction St. Johns 272 rue Racine, Chicoutimi	PLANT— Richmond Co. Petite Rivière. St. Remi d'Amherst. Deschailions. Beaumont-Est. L'Islet Station, Bois- chatel. Victoriaville. St. Tite. Richmond. Westbury. Princeville. Shawville. LaPrairie and Delson. Deschailions. Lakeside. Deschailions. LaPrairie. Dorchester Co. St. Johns. Chicoutimi.
ONTARIO— Barnes, Wm. R., Company Ltd. Belle River Brick & Tile Co. Brampton Pressed Brick Co., Ltd. Broadwell, B. & Son Canadian Pressed Brick Co., Ltd. Central Tile Brick Corp., Ltd. Chapman Bros. Construction Materials Ltd. Cooksville Co., Ltd. Cornhill, James & Sons Ltd. Coulitis, Geo. & Son Cowell, Geo. Wesley	243 Cumberland Ave., Hamilton Belle River Brampton Kingsville Kenilworth Ave. S., Hamilton Box 25, Tilbury 145 Dawes Road, Toronto Drawer 70, New Toronto 46 Bloor St. W., Toronto Stanley Ave., Chatham Thetford Box 361, Tilsonburg	PLANT— Hamilton. Essex County. Peel County. Essex County. Hamilton. Kent Co. E. York Tp. Etobicoke Tp. Cooksville. Chatham. Lambton County. Oxford County.

DOMESTIC CLAY PRODUCTS INDUSTRY—Continued

Brick-Tile-Sewer pipe, etc.—Continued

Name	Head office address	Location
ONTARIO—		PLANT—
Curtin, F., Estate of.....	R. R. 4, Lindsay.....	Victoria County.
Curtis Bros.....	Box 809, Peterborough.....	Otonabee Tp.
Deller, A. & Son.....	Brownsville.....	Oxford County.
Deller, Wm. H.....	Thorndale, R. R. 4.....	W. Nissouri Tp.
Dochart Brick, Tile & Terra Cotta Works.....	Arnprior.....	Arnprior.
Donaldson, Thos. Geo.....	R. R. 1, Greenock.....	Culross Tp.
Douglas, John R.....	Wilkesport.....	Lambton County.
Elliott, Chas.....	Bluevale.....	Huron County.
Elliott, Jas., Jr.....	519 Wellington St. W., Sault Ste. Marie.....	Korah Tp.
Elliott, Wm., Jr.....	Glenannan.....	Bruce County.
Ferguson, A. W.....	95 Rectory St., London.....	London.
Fletcher Brick and Tile.....	Fletcher.....	Kent Co.
Fort William Brick Co.....	Fort William.....	Fort William.
Frid Bros. Ltd.....	Main West and Macklin Sts., Hamilton.....	Hamilton.
Gamage, C. R.....	R. R. 2, Dresden.....	Lambton County.
Gomoll Brick & Tile Works.....	Powassan.....	S. Himsworth Tp.
Gomoll Brick Co.....	348 Greenwood Ave., Toronto.....	Toronto.
Haist, W. R.....	Crediton.....	Crediton.
Hamilton Pressed Brick Co., Ltd.....	211 Kensington Ave. S., Hamilton.....	Wentworth County.
Harper Brick Works.....	348 Greenwood Avenue, Toronto.....	Toronto.
Hill, Aaron.....	Essex.....	Essex.
Hill, Albert W.....	R. R. 1, Coatsworth.....	Tilbury E. Tp.
Hitch, D. A.....	Ridgetown.....	Howard Tp.
Hitch, T.....	First Ave., St. Thomas.....	St. Thomas.
Hodder, Mrs. J. H., & Sons.....	Dutton.....	Elgin County.
Howlett, Fred W., & Sons, Ltd.....	Box 849, Petrolia.....	Petrolia.
Huntsville Brick Works.....	Box 308, Huntsville.....	Muskoka.
Interprovincial Brick Co., Ltd.....	46 Bloor St. W., Toronto.....	Chinquacousy Tp.
Jackson, W. B., Brick & Tile.....	Brantford.....	Nassagaweya Tp.
Jamieson Lime Co.....	Renfrew.....	Brantford.
Janes, D. A.....	Mt. Brydges.....	Renfrew.
Jasperson Brick & Tile Co.....	Kingsville.....	Middlesex Co.
Jervis, W. J.....	R. R. 3, Dorchester.....	Coatsworth.
Kerr, C., Estate of.....	R. R. 4, Goderich.....	N. Dorchester.
Kerr, Fred.....	Crediton.....	Huron County.
Koebel Bros.....	St. Clements.....	Crediton.
Lindsay, Earl & Sons.....	R. R. 2, Wallaceburg.....	St. Clements.
McComb, Chester.....	R. R. 2, London.....	Kent County.
McCormick, Thos. L.....	R. R. 5, Watford.....	Middlesex Co.
McFarlane, W. J.....	Forest.....	Lambton County.
McFarren, F. B. Ltd.....	38 Toronto St., Toronto.....	Lambton County.
Milton Brick Co., Ltd.....	170 Bloor St. W., Toronto.....	Streetsville.
Moulton's Tile & Brick Yard.....	R. R. 2, Holyrood.....	Milton.
Napanee Brick & Tile Works.....	R. R. 3, Napanee.....	Greenock Tp.
National Fireproofing Co. of Canada, Ltd.....	96 Bloor St. W., Toronto 5.....	Lennox County.
National Sewer Pipe Co., Ltd.....	Aldershot.....	Wentworth Co.
Northern Brick & Clay Products.....	New Liskeard.....	Hamilton, Swansea.
Norwich Brick & Tile Works.....	R. R. 2, Norwich.....	New Liskeard.
Ontario Brick & Tile Plant (Government).....	Parliament Bldgs., Toronto.....	Oxford County.
O'Reilly, T. E.....	320 Bay St., Ottawa.....	Mimico.
Ottawa Brick & Terra Cotta Co., Ltd.....	Box 131, Billings Bridge.....	Carleton County.
Owen Sound Brick Co., Ltd.....	Owen Sound.....	Carleton County.
Paxton, Fred R.....	St. Catharines.....	Owen Sound.
Phinn, Geo. A.....	St. James Park, London.....	St. Catharines.
Phippen, H. W. & Son.....	390 Dawes Road, Coleman P.O., Toronto.....	Middlesex County.
Richardson, J. & Son.....	Kerwood.....	E. York Tp.
Rollins, D. W.....	R. R. 4, Belleville.....	Kerwood.
Seegmiller Brick and Tile Company.....	525 Wendell Ave., Kitchener.....	Thurlow Tp.
Shelgrove, A., Estate of.....	Beaverton.....	Kitchener.
Sproat & Sproat.....	R. R. 4, Seaford.....	Beaverton.
Standard Brick Co.....	500 Greenwood Ave., Toronto.....	Tuckersmith Tp.
Superior Brick & Tile Co., Ltd.....	Fort William.....	Toronto.
Thomson, Ralph.....	R. R. 4, Atwood.....	Paipoonge Tp.
Toronto Brick Co., Ltd.....	897 Bay St., Toronto.....	S. Grey Tp.
Wagstaff Brick & Tile Co.....	92 Simcoe St., Lindsay.....	Todmorden, Toronto.
Wallace, R., and Son.....	32 First Ave. E., North Bay.....	Victoria County.
Wein, Aaron.....	Crediton.....	Widdifield Tp.
Weitzel Bros.....	R. R. 1, Tavistock.....	Huron County.
Wright, Geo., & Sons.....	Box 56, Comber.....	Zora Tp.
		Comber.
MANITOBA—		PLANT—
Alsip Brick, Tile & Lumber Co., Ltd.....	537 Portage Ave., Winnipeg.....	Winnipeg.
O'Day & Spencer (b).....	R. R. 1, Morden.....	Morden.
Snyder Brick Yards Ltd.....	Portage la Prairie.....	Portage la Prairie.
Wardrop, D. M.....	Whitemouth.....	Whitemouth.
Western Clay Products Ltd.....	507 Somerset Blk., Winnipeg.....	Edrans.

DOMESTIC CLAY PRODUCTS INDUSTRY—Concluded

Brick-Tile-Sewer pipe, etc.—Concluded

List of Operators shipping Brick, Tile, Sewer Pipe, etc., made from Domestic Clays, 1940—Concluded

Name	Head office address	Location
SASKATCHEWAN—		
Alberta Clay Products Co., Ltd. (a).....	Medicine Hat, Alberta.....	PLANT— Willows, Ravenscrag and Eastend.
Bruno Clay Works Ltd.....	Saskatoon.....	Bruno.
Dominion Fire Brick and Clay Products Ltd. (a).....	Box 99, Moose Jaw.....	Claybank.
International Clay Products Ltd.....	Box 399, Estevan.....	Estevan, Knollys and Willows.
Midland Clay Co.....	Willow Bunch.....	Willow Bunch.
Medalta Potteries Ltd.....	620 3rd St. W., Calgary, Alberta.....	Eastend and Willows.
ALBERTA—		
Aetna Coal Co., (b).....	East Coulee.....	PLANT— Tp. 28 Rge. 19 W4th.
Acme Brick Co., Ltd.....	125 Alberta Block, Edmonton.....	Cannell.
Alberta Clay Products Co., Ltd.....	Cor. Bridge & Clay Sts., Medicine Hat.....	Medicine Hat.
Grande Prairie Brick Yard.....	Box 1722, Grande Prairie.....	Dunmore.
Gunderson Brick & Coal Co., Ltd.....	Redcliff.....	Grande Prairie.
Kidd, Gordon L. (b).....	Box 230, Drumheller.....	Redcliff.
Little, J. B. & Sons Ltd.....	9120 100th Ave., Edmonton.....	Sec. 14-29-20 W.4.
Medicine Hat Brick & Tile Co., Ltd.....	Box 1000, Medicine Hat.....	Edmonton.
Redcliff Pressed Brick Co., Ltd. (a).....	Box 87, Redcliff.....	Medicine Hat.
Redcliff Premier Brick Co., Ltd.....	Redcliff.....	Redcliff.
BRITISH COLUMBIA—		
Baker Brick & Tile Co., Ltd.....	3191 Douglas St., Victoria.....	PLANT— Victoria.
Clayburn Co., Ltd. (a).....	850 W. Hastings St., Vancouver.....	Kilgard.
Champion and White Ltd.....	1075 Main St., Vancouver.....	Bazan Bay Road.
Fairey & Company (a).....	661 Taylor St., Vancouver.....	Williams Lake.
Glover, Francis (b).....	Princeton.....	Princeton.
Gorse, Percy A.....	Salmon Arm.....	Enderby.
Haug, Wm., & Son.....	Box 220, Kelowna.....	Kelowna.
McBride, T. G.....	1051 Main St., Vancouver.....	Gabriola Island.
Port Haney Brick Co., Ltd.....	846 Howe St., Vancouver.....	Haney.
Richmond, Geo. W., & Co. (a).....	3239 W. King Edward Ave., Vancouver.....	Kilgard.
Vancouver Brick & Tile Ltd.....	Ft. Columbia Ave., Vancouver.....	Sullivan.

(a) Includes Production of refractories. (b) Produces bentonite.

PRODUCERS OF STONEWARE AND POTTERY FROM DOMESTIC CLAYS

NEW BRUNSWICK—		
Deichmann, Kjeld and Erica.....	Moss Glen.....	PLANT— Moss Glen and Middle Musquodoboit, N.S.
The Foley Pottery Ltd. (a).....	Saint John.....	Saint John, Middle Musquodoboit, N.S.
Mowat, Miss G. Helen.....	St. Andrew's.....	St. Andrew's.
ONTARIO—		
The Foster Pottery Co.....	Main St. W., Hamilton.....	PLANT— Hamilton.
ALBERTA—		
Alberta Clay Products Co.....	Medicine Hat.....	PLANT— Medicine Hat.
Medalta Potteries Ltd.....	336 7th Ave. W., Calgary.....	Medicine Hat.
Medicine Hat Potteries.....	Box 672, Medicine Hat.....	Medicine Hat.
BRITISH COLUMBIA—		
Baker Brick & Tile Co., Ltd.....	3191 Douglas St., Victoria.....	PLANT— Victoria.
B. C. Clay Products Co.....	3439 Euclid Ave., Vancouver.....	Vancouver.

Lime Industry

NOVA SCOTIA—		
Dominion Steel & Coal Corp., Ltd. (b).....	Sydney.....	PLANT— Sydney.
Eastern Lime Co., Ltd.....	Windsor.....	Windsor.
NEW BRUNSWICK—		
Bathurst Power and Paper Co., Ltd. (a).....	Bathurst.....	PLANT— Bathurst.
Purdy & Green, Ltd. (a).....	204 Metcalf St., Saint John.....	Saint John.
Randolph & Baker, Ltd. (a) (b) (c).....	Randolph.....	Randolph.
Snowflake Lime Limited. (a) (b).....	3 Pokiok Road, Saint John.....	Saint John.
St. John Lime Co. (a) (b).....	Brookville.....	Brookville.

PRODUCERS OF STONEWARE AND POTTERY FROM DOMESTIC CLAYS—Concluded

Lime Industry—Continued

Name	Head office address	Location
QUEBEC—		
Arnaud, Edwilda, Mme.	Joliette	PLANT— Joliette.
Boivin, Arthur	Pont Rouge	Pont Rouge.
Canada Lime & Stone, Ltd. (a)	St. Marc des Carrières	St. Marc des Carrières.
Carrière St. Maurice Ltée.	307 Alexandre, Trois Rivières	St. Louis de France.
Carswell, Robt. B. (c)	Bryson	Bryson.
Côté, Joseph (a)	Metabetchouan	Metabetchouan.
Desfond, C. (a)	St. Cuthbert	St. Cuthbert.
Donigny, Raymond	Ste. Thècle	Ste. Thècle.
Dominion Lime Ltd. (a)	Lime Ridge	Lime Ridge.
Filion, Narcisse	St. Joachim	St. Joachim.
Gagné, Octave	St. Ulric	St. Ulric.
Héon and Héon (a)	St. Louis de France	St. Louis de France.
Lalumière, Joseph	St. Dominique de Bagot	St. Dominique de Bagot.
Machabée, Lucien (a)	Ste. Anne des Plaines	Ste. Anne des Plaines.
Limoges, Henri (a)	552 Pouport St., Montreal	St. Michel.
Marcotte, J. A. Dr. (c)	4403 St. Hubert, Montreal	St. Marc des Carrières.
Mercure, C. (a)	9 rue St. Denis, St. Hyacinthe	St. Dominique de Bagot.
Shawinigan Chemicals Ltd. (a)	107 Craig St. West, Montreal	Shawinigan Falls.
Standard Lime Co., Ltd. (a)	Joliette	St. Paul de Joliette.
Trottier, David	St. Marc des Carrières	St. Marc des Carrières.
Villeneuve, R. (a)	St. Jérôme	St. Jérôme.
ONTARIO—		
Bell, Harry	R. R. 4, Chesley	Grey County.
Biederman, Albert G. (a)	R. R. 1, Golden Lake	Golden Lake.
Brown's Lime Works (b)	Owen Sound	Owen Sound.
Brunner, Mond Canada, Limited (a)	Canadian Bank of Commerce Bldg., Toronto	Amherstberg Dist.
Cameron, W. M. (a)	Box 65, Carleton Place	Carleton Place.
Canada and Dominion Sugar Co., Ltd. (a)	Chatham	Chatham, Wallaceburg.
Canada Lime Co. (a)	Coboconk	Coboconk.
Canadian Gypsum Co., Ltd. (b)	170 Bloor St. W., Toronto	Guelph.
Chalmers Lime Products (b)	Owen Sound	Owen Sound.
Electro Metallurgical Company of Canada, Limited (a)	Canada Life Bldg., Toronto	Welland.
Federal Lime Ltd. (a)	Eganville	Grattan Tp.
Gypsum, Lime & Alabastine, Canada Ltd. (a) (b)	Paris	Beachville, Hespeler, Milton.
Innerkip Lime & Stone Co., Ltd. (a)	Beachville	Beachville.
Jamieson Lime Co.	Renfrew	Renfrew County.
Laurentian Stone Co., Ltd. (a)	195 Nicholas St., Ottawa	Ottawa and Hull.
North American Cyanamid Ltd. (a)	Royal Bank Bldg., Toronto	Niagara Falls.
Patricia Lime Co., Ltd. (a)	701 National Bldg., Toronto	Red Lake Dist.
Rockwood Lime Co. (b)	Box 46, Rockwood	Rockwood.
Shane Lime and Charcoal Co., Ltd. (a)	Eganville	Renfrew County.
MANITOBA—		
Gillis Quarries Ltd. (a) (b)	Richard and Spruce Sts., Winnipeg	Garson, Stonewall.
Gypsum, Lime and Alabastine, Canada, Ltd. (a) (b)	Paris, Ont.	Winnipeg.
Winnipeg Supply & Fuel Co., Ltd., (a) (b)	812 Boyd Bldg., Winnipeg	Moosehorn, Stonewall.
ALBERTA—		
Canadian Sugar Factories Ltd. (a)	Raymond	Raymond.
Loder's Lime Co., Ltd. (a)	Kananaskis	Kananaskis.
Summit Lime Works (a)	Box 273, Lethbridge	Lethbridge Dist.
BRITISH COLUMBIA—		
Pacific Lime Co., Ltd. (a)	744 West Hastings St., Vancouver	Texeda Island.
Pacific Mills Ltd. (a)	Campbell Ave., Vancouver	Ocean Falls.
Victoria Lime Co. (a)	R.R. 1, Victoria	Parsons Bridge.

(a) Use Calcium or high calcium limestone.

(b) Use dolomite or dolomitic limestone.

(c) No production reported in 1940.

PRINCIPAL SAND AND GRAVEL OPERATORS

In addition to the names listed below, production has been reported by the railway companies for ballast, and also a considerable amount by counties and townships in Ontario for road use.

(w) Markets washed or screened material.

NOVA SCOTIA—		
Crockett, V. B.	71 King St., Truro	Colchester Co.
Mosher, Walter	307 Portland St., Dartmouth	Elmsdale.
Munitions & Supply Department	Ottawa, Ont.	Various.
Nova Scotia Department of Highways	Halifax	Various.

PRINCIPAL SAND AND GRAVEL OPERATORS—Continued

Name	Head office address	Location
NEW BRUNSWICK—		
Likely, Jos. A., Ltd. (w).....	Saint John.....	East Saint John.
Maxwell, Chas. & Son.....	St. Stephen.....	St. Stephen.
McAvity, Allen J. (w).....	Little River.....	Little River.
New Brunswick Department of Highways.....	Fredericton.....	Various.
QUEBEC—		
Bigres, Omer.....	Ste. Rose Ouest.....	Ste. Rose Ouest.
Bonner Sand & Ballast Ltd. (w).....	1434 St. Catherine St. W., Montreal.....	Abbotsford and South Durham.
Brouillet Sand & Gravel (w).....	Rawdon.....	St. Julienne.
Canadian Johns-Manville Co., Ltd.....	Sun Life Bldg., Montreal.....	Asbestos.
Carrière, Turcotte & Asselin Enrg.....	Château Richer.....	Lac Beauport.
Coaticook, Ville de (w).....	100 rue Child, Coaticook.....	Coaticook.
Concrete Sand & Gravel Co., Ltd.....	Rawdon.....	St. Julienne.
Cie de Sable Ltée, La.....	10 3rd Ave., Quebec.....	River St. Charles.
Consolidated Oka Sand & Gravel Co., Ltd. (w).....	248 McCord St., Montreal.....	Lake of Two Mountains.
Gagnon & Frère Enrg.....	St. David, Cté Lévis.....	St. David.
Granby, City of.....	Granby.....	Granby.
Lalupille, Philippe (w).....	238 rue de la Ronde, Quebec.....	River St. Charles.
Laval Construction Inc.....	809 Sun Life Bldg., Montreal.....	Trois Saumons Stn.
Magog, Ville de.....	Box 710, Magog.....	Magog.
National Sand & Material Co., Ltd., (w).....	75 Richmond St., Montreal.....	St. Lawrence River.
Potier & Frères.....	8645 rue Casgrain, Montreal.....	Deux Montagnes Co.
Quebec Department of Highways.....	Quebec.....	Various.
Quebec, Cité de.....	Quebec.....	Ste-Thérèse de Beauport.
St. Francis River Dredging Co. (w).....	St. François du Lac.....	St. Francis River.
Sherbrooke, City of.....	Sherbrooke.....	Orford Tp.
Standard Lime Co., Ltd. (w).....	Joliette.....	St. Emelie.
Standard Sand & Gravel Ltd. (w).....	St. Félix de Valois.....	St. Félix de Valois.
St. Hyacinthe Transport Inc.....	St. Hyacinthe.....	Mascouche.
Venne, Oscar.....	Lachenaie.....	Lachenaie.
ONTARIO—		
Axford, J. B. & Sons.....	35 Elm St., St. Thomas.....	South Yarmouth Tp.
Barnes, Wm. R., Co., Ltd. (w).....	243 Cumberland Ave., Hamilton.....	Hamilton, Springvale, Waterdown.
Bellyou, N. E.....	R. R. 4, Trenton.....	Murray Tp.
Birch, Jas. A.....	R. R. 2, Richmond.....	Nepean Tp.
Bisonette, W. A.....	R. R. 3, Smiths Falls.....	Montague Tp.
Boyd Bros.....	Osgoode.....	Osgoode.
Braas Bros. Hillcrest Sand Co.....	R. R. 3, Niagara Falls.....	Stamford.
Brantford, City of (w).....	City Hall, Brantford.....	Brantford.
Brennan Paving Co., Ltd.....	400 Gage Ave. N., Hamilton.....	Simcoe.
Burrows, John.....	447 Klock Ave., North Bay.....	Widdifield Tp.
Cameron, Chas. M.....	R. R. 1, Glencoe.....	Mosa Tp.
Canadian Aggregates Ltd. (w).....	Walkerville.....	Burford Tp.
Colwell, Len (w).....	Landesboro.....	Hullett Tp.
Conlin, Herbert L. (w).....	Highland Creek.....	Scarboro Tp.
Consolidated Sand & Gravel Ltd.....	402 Harbour Commission Bldg., Toronto.....	Durham, Fuller, Paris, Waterford.
Cudmore, Mrs. Alice.....	R. R. 1, Hensall.....	Usborne Tp.
Curran & Briggs.....	203 Manning Chambers, Toronto.....	Northern Ontario.
Davison, Lloyd L.....	Glen Williams.....	Halton Co.
Dibblee Construction Co., Ltd.....	248 Albert St., Ottawa.....	Pt. Fortune and Alexandria.
Dominion Concrete Co. Ltd. (w).....	Kemptville.....	near Kemptville.
Forrester, Wm. E.....	Box 201, Morewood.....	Winchester Tp.
Foster, R. R. (w).....	86 Spadina Ave., Ottawa.....	near Ottawa.
Frid Bros. Ltd.....	Main and Macklin Sts., Hamilton.....	Hamilton.
Guelph Sand and Gravel Ltd. (w).....	Guelph.....	Guelph Village.
Grandmaitre, D.....	71 Montreal Road, Eastview.....	Rockcliffe Park.
Hinde Bros.....	134 Northland Ave., Toronto.....	Mount Dennis.
Hollinger Cons. Gold Mines Ltd.....	Timmins.....	Tisdale Tp.
Howard Sand & Gravel Co., Ltd. (w).....	Aldershot.....	E. Flamboro Tp.
Hydro Electric Power Commission.....	620 University Ave., Toronto.....	Kenora Dist.
Jupp, A. E., Construction Co., Ltd. (w).....	Rear 56 Boulbee Ave., Toronto.....	Various.
Kilbourne, H. and Son.....	London.....	London Dist.
Kingston Sand & Gravel Ltd.....	235 Wellington St., Kingston.....	Glenburne.
Lake Shore Mines Ltd.....	Kirkland Lake.....	Kirkland Lake.
London Sand & Stone Ltd.....	294 Dundas St., London.....	London Tp.
McCollum Bros.....	Winona.....	Saltfleet Tp.
McLean, A. B. & Sons.....	Sault Ste. Marie.....	Lake Superior.
McLellan, James E.....	R. R. 2, Thamesford.....	E. Nissouri Tp.
McQuillin, W. F.....	R. R. 1, Lucknow.....	West Wawanosh Tp.
Mintern, Tom.....	Brantford.....	Brantford.
National Sand & Material Co., Ltd.....	402 Harbour Commission Bldg., Toronto.....	Point Pelee, Niagara River, Eastern Cap.
Nevill, George.....	R. R. 5, Aylmer.....	Malahide Tp.
Newell, Herbert.....	R. R. 4, Aylmer.....	Malahide Tp.
Page, Jacob H.....	R. R. 3, Fenwick.....	near Fenwick.
Pyke Salvage Co.....	506 Princess St., Kingston.....	River St. Lawrence.
Quigley's (w).....	Bartonville P.O.....	Waterdown.

PRINCIPAL SAND AND GRAVEL OPERATORS—Continued

Name	Head office address	Location
ONTARIO—Concluded		
Rayner Construction Ltd.	29 Commercial St., Leaside	Fergus and Geraldton,
Sandy & Salkeld	Goderich	Various.
Sarjeant Co., Ltd., The	51 Dunlop St., Barrie	Barrie.
Scott, Thos. J.	66 March St., Sault Ste. Marie	Lake Superior.
Skinner, R.	Exeter	Exeter.
Smythe, C. Ltd.	Carlton & Church Sts., Toronto	Etobicoke Tp.
Spratt, G. H. (w.)	Billings Bridge	Billings Bridge.
Stewart, Fenwick	R. R. 5, Clinton	Stanley Tp.
Tees Transit Co.	77 Sterling St., Hamilton	Niagara Bar.
Towland Construction Co., Ltd.	294 Dundas St., London	N. Dorchester Tp.
United Towing & Salvage Co., Ltd.	635 Common St., Montreal	Lake Superior.
Warren Bituminous Paving Co., Ltd. (w.)	437 Fleet St. W., Toronto	Haliburton Co.
White, Bertha M.	209 N. Vidal St., Sarnia	near Sarnia.
White, Homer & Co.	Pictou	Pictou.
Wilcox, Hervey	985 Bridge St., Niagara Falls	Stamford Tp.
Woollatt Fuel & Supply Co., Ltd. (w.)	2171 Ottawa St., Windsor	Mersea Tp.
Wright & Co.	960 Queen St., Sault Ste. Marie	Korah Tp.
MANITOBA—		
Alsip Brick Tile & Lumber Co., Ltd.	537 Portage Ave., Winnipeg	Beausejour.
Brandon, City of	City Hall, Brandon	Brandon.
Building Products & Coal Co., Ltd. (w.)	Christie St., Winnipeg	Birds Hill.
Greater Winnipeg Water District	185 King St., Winnipeg	Mile 31 and Mile 80 G.W.W. D. Ry. Ste. Anne. Various. "
Jackson, Thos. & Sons Ltd.	370 Colony St., Winnipeg	near Rosser.
Manitoba Department of Highways	Winnipeg	Various.
McCurdy Supply Co., Ltd. (w.)	1034 Arlington St., Winnipeg	"
Mulligan, F. A.	Rosser	near Rosser.
Munitions & Supply Department	Ottawa, Ont.	Various.
National Parks Branch	Department of Mines and Resources, Ottawa	Riding Mountain Park.
North West Gravel & Coal Co., Ltd.	612 Toronto General Trusts Bldg., Winnipeg	S3 35-11-4 E.
Provincial Gravel & Coal Co., Ltd. (w.)	704 Gt. West Permanent Bldg., Winnipeg	Municipality of Springfield.
Riley, W. J. (w.)	Molson	Molson.
Rosser Sand and Gravel	Rosser	Rosser.
Winnipeg, City of, Hydro Electric System	55 Princess St., Winnipeg	Sec. 31, Tp. 15-R.14 E.
SASKATCHEWAN—		
Betteridge, Stanley	Pilot Butte	Pilot Butte.
Brule, Hector	Flin Flon, Man.	Flin Flon.
Carter-Halls-Aldinger Co., Ltd.	400 Royal Bank Bldg., Winnipeg, Man.	Sturgis.
Casson, J. T.	Flin Flon, Man.	Flin Flon.
Dawson Wade & Co., Ltd.	775 Clarke Drive, Vancouver, B.C.	Dafoe.
Dufferin Paving Co., Ltd.	445 Fleet St. W., Toronto 2, Ont.	Tp. 16, R. 13, W. 3.
Eamon, H. G. & Co.	Biggar	Biggar.
Evans Gravel Surfacing Co., Ltd.	419 23rd St. W., Saskatoon	Ardrill and Butress.
Elander, John	Flin Flon, Man.	Flin Flon.
Flin Flon, Mun. Dist of	Flin Flon, Man.	Flin Flon.
Hudson Bay Mining & Smelting Co., Ltd.	14 Finkle St., Woodstock	Flin Flon.
Kjarsgaard, Robert	1035 Alder Ave., Moose Jaw	Moose Jaw.
MacKenzie Supply Co., Ltd.	P. O. Box 507, Regina	Imperial.
McNamara Construction Co., Ltd.	42 Industrial St., Leaside, Toronto, Ont.	North Battleford.
Munitions & Supply Department	Ottawa, Ont.	Various.
National Parks Branch	Department of Mines & Resources, Ottawa, Ont.	Prince Albert National Park.
Nelson River Construction Ltd.	607 Union Trust Bldg., Winnipeg, Man.	Lady Lake.
North Battleford, City of	1201 King St., North Battleford	North Battleford.
Northern Cartage & Contracting Co., Ltd.	Prince Albert	Prince Albert.
Pilot Butte Sand & Gravel Co., Ltd.	Pilot Butte	Pilot Butte.
Poole Construction Co. (Sask.) Ltd.	Regina	Moss Bank.
Prince Albert, City of	Prince Albert	Prince Albert.
Saskatchewan, Dept. of Highways	Regina	Various.
Stanicky, V. A.	1757 St. John St., Regina	near Regina.
Western Canada Construction Ltd.	Garneau Theatre Bldg., Edmonton, Alta.	Desisle.
ALBERTA—		
Alberta Dept. of Highways	Edmonton	Various.
Cristall Sand (w.)	10165, 104th St., Edmonton	Perryvale.
Jefferies & Sons Ltd. (w.)	Calgary	Calgary.
Munitions & Supply Department	Ottawa, Ont.	Various.
National Parks Branch	Department of Mines and Resources, Ottawa, Ont.	National Parks.
BRITISH COLUMBIA—		
Armstrong, City of	Armstrong	Vernon M.D.
B.C. Department of Highways	Victoria	Various.
Burnaby, District of	Edmonds, via New Westminster	Mun. of Burnaby.
Cascade Rock & Gravel Co., Ltd. (w.)	Lynnmour	Lynnmour.
Chilliwack, City of	Chilliwack	Chilliwack Tp.
Consolidated Mining & Smelting Co., Ltd.	Trail	Trail.
Cranbrook, Corp. of (w.)	Cranbrook	Cranbrook.
Deeks Sand & Gravel Co., Ltd. (w.)	101 W., 1st Ave., Vancouver	Seymour Creek, North Vancouver and Coquitlam.

PRINCIPAL SAND AND GRAVEL OPERATORS—Concluded

Name	Head office address	Location
BRITISH COLUMBIA—Concluded		
Fernie, City of.....	Fernie.....	Fernie.
Fresh Water Sand & Gravel Co., Ltd. (w).....	902 Columbia St., New Westminster.....	Port Coquitlam.
Hillside Sand & Gravel Ltd. (w).....	1075 Main St., Vancouver.....	Hillside, Howe Sound.
Kamloops, City of (w).....	288 First Ave., Kamloops.....	Kamloops.
Mount Tolmie Sand & Gravel Co., Ltd.....	Richmond and Mayfair, Victoria.....	Victoria.
Munitions & Supply Dept.....	Ottawa, Ont.....	Various.
National Parks Branch.....	Department of Mines and Resources, Ottawa, Ont.	National Parks.
Nelson, City of.....	501 Front St., Nelson.....	Kootenay Dist.
Pitkethly Bros.....	1875 E. 38th Ave., Vancouver.....	Vancouver.
Port Alberni, City of.....	Port Alberni.....	Alberni Dist.
Port Coquitlam, City of.....	Port Coquitlam.....	Port Coquitlam.
Prince Rupert, City of.....	Prince Rupert.....	Prince Rupert.
Producer's Sand & Gravel Co. (1929) Ltd.....	1902 Store St., Victoria.....	Esquimalt.
Saanich, Dist. of.....	Royal Oak P. O. V.I.....	Mun. of Saanich.
Swinerton, Robert H.....	620 Broughton St., Victoria.....	Metchosin.
Trail, City of.....	1394 Pine Ave., Trail.....	Trail.
West Kootenay Power & Light Co., Ltd.....	1385-1387 Cedar Ave., Trail.....	Trail.

STONE QUARRYING INDUSTRY

NOTE.—(x) Firms operating dressing works in conjunction with quarry.

(a) Did not ship in 1940.

Granite

NOVA SCOTIA—		
Bower, A. R.....	Box 255, Shelburne.....	Shelburne.
Dauphinee, W. T. (x).....	Shelburne.....	Shelburne.
Nixon, W. H. (x) (a).....	Nictaux Falls.....	Nictaux West.
Nova Scotia Department of Highways.....	Halifax.....	Various.
Rice Bros. (x).....	Lawrencetown.....	Nictaux West and Birchtown
Rice, W. D.....	Middleton.....	Nictaux west.
Shelburne Marble and Granite Works (C. G. Reid)(x) (a).....	Shelburne.....	Birchtown.
Porter, J. P. & Sons Ltd. (x).....	936 Dominion Square Bldg., Montreal, Que..	Chester.
NEW BRUNSWICK—		
Granite Street Pavement & Construction Co., Ltd. (x).....	Box 1137, Saint John.....	Hampstead.
Milne Coutts & Co., Ltd. (x).....	St. George.....	St. George.
B. Mooney & Sons Realty Ltd. (x).....	49 Canterbury St., Saint John.....	Hampstead.
O'Brien & Baldwin (x).....	St. George.....	St. George.
QUEBEC—		
Aluminum Power Co., Ltd.....	P. O. Box 6090, Dominion Square East, Montreal.	Chicoutimi Co.
B. and R. Granite Quarry.....	Beebe.....	Ogden Twp.
Bérubé, Lucien (x).....	Brownsburg.....	Chatham Twp.
Brasseur, S.....	McWatters.....	McWatters.
Brodie's Ltd. (x).....	1070 Bleury St., Montreal.....	Graniteville, Guenette, Mount Johnson.
Bullock, W. W.....	Graniteville.....	Ogden Twp.
Bureau de Reconstruction Economique.....	Quebec.....	Various.
Bussière, A. L. (x).....	St. Sébastien.....	Gayhurst Twp.
City of Chicoutimi.....	Chicoutimi.....	Chicoutimi.
Cloutier, R. L. (x).....	Beebe.....	Beebe.
Delwaide & Goffin (x).....	1365 St. Valier, Quebec.....	Chicoutimi.
Deschambault Quarry Corp. (x).....	56 rue St. Pierre, Quebec.....	St. Gérard de Wolfe.
Didier, Jos. Belley.....	Jonquière.....	Jonquière.
Dontigny, Alphonse.....	Shawinigan Falls.....	Shawinigan Falls.
Drummond Quarry Ltd.....	Drummondville.....	Drummondville.
Dufresne Engineering Co., Ltd.....	1832 Pius IX Blvd., Montreal.....	Landanac Twp.
Dumas and Voyer.....	Rivière a Pierre.....	Bois Twp.
Dumas, Auguste (x).....	Rivière a Pierre.....	Bois Twp.
Gagnon, Arthur.....	Chemin St. Louis, Grand Mère.....	Grand Mère.
Gingras & Frère Ltée (x).....	St. Marc des Carrières.....	Fisher Station.
Gosselin, Oscar.....	Megantic.....	Megantic.
Grenier, Elie.....	Glenada.....	Glenada.
Henrickson & Hokanson.....	R. R. 1, Beebe.....	Graniteville.
Lacasse & Boulais.....	Box 23, Beebe.....	Beebe.
Laroche, Omer.....	Rivière a Pierre.....	Rivière a Pierre.
La Ville de Jonquière.....	Jonquière.....	Chicoutimi Co.
Le Granit National (x).....	St. Joseph d'Alma.....	Signal Twp.
Les Carrières de Granit Frontenac.....	Scott Junction.....	Frontenac Co..
Maltais, Charles.....	St. Joseph d'Alma.....	St. Joseph d'Alma.
McIntosh, Robert.....	Beebe.....	Beebe.
Quebec Department of Highways.....	Quebec.....	Various.
Port Alfred, Town of.....	Port Alfred.....	Port Alfred.

STONE QUARRYING INDUSTRY—Continued

Granite—Concluded

Name	Head office address	Location
QUEBEC—Concluded		
Riverin & Riverin.....	Chicoutimi.....	Chicoutimi.
St. Bruno Quarry & Paving Co., Ltd.....	636 Ave. Querbes, Outremont.....	Chambly Co.
St. Jérôme, Ville de.....	St. Jérôme.....	St. Jérôme.
St. Maurice Power Corp.....	Box 6072, Montreal.....	La Tuque.
Scotstown Granite Co., Ltd. (x).....	660 St. Catherine St. W., Montreal.....	Lingwick Twp.
Sherbrooke, City of.....	Sherbrooke.....	Sherbrooke.
Silver Granite Co., Ltd. (x).....	2331 rue Provencal, Quebec.....	St. Samuel Station.
Stanstead Granite Quarries Co., Ltd. (x).....	Beebe.....	Graniteville.
Théberge, J. R.....	Chicoutimi.....	St. Ignace Twp.
Wilkinson, Frank L. (x).....	Beebe.....	Stanstead Co.
ONTARIO—		
Building Products Ltd.....	Box 6063, Montreal, Que.....	Verona, Mountain Grove.
Canadian Dredge & Dock Co., Ltd.....	302 Harbour Commission Bldg., Toronto.....	Thunder Bay Dist.
Fort William, City of.....	Fort William.....	Mt. McKay.
Grenville Crushed Rock Co., Ltd.....	917 Keefer Bldg., Montreal.....	Hawk Lake.
Hewitson Construction Co., Ltd.....	Port Arthur.....	McIntyre Twp.
Horne, Wm. Granite Quarries (x).....	Butler via Ignace.....	Butler.
Hydro Electric Power Commission.....	620 University Ave., Toronto.....	Kenora Dist.
Mill Lake Stone Quarry.....	Parry Sound.....	Mill Lake.
Ontario Rock Co., Ltd.....	18 Grenville St., Toronto.....	Belmont and Methuen Twp.
Orser, C. C. & Sons (x).....	Verona.....	Verona.
Upper Canada Granite Quarries Ltd.....	1406 Concourse Bldg., Toronto.....	Coe Hill.
MANITOBA—		
Winnitoba Marble Co., Ltd. (x).....	1180 Wall St., Winnipeg.....	Hawk Lake.
BRITISH COLUMBIA—		
B. C. Monumental Works Ltd. (x).....	27 Kingsway, Vancouver.....	Granite Island.
Canadian National Railways.....	Montreal, Que.....	Various.
Canadian Pacific Railways.....	Montreal, Que.....	Ashcroft and Golden.
Coast Quarries Ltd.....	1840 Georgia St. W., Vancouver.....	Granite Falls.
Gilley Bros. Ltd.....	902 Columbia St., New Westminster.....	Granite Island.
Nelson, City of.....	Nelson.....	Kootenay Dist.
Nelson Granite & Monumental Co.....	505 Front St., Nelson.....	Nelson.
Prince Rupert, City of.....	Prince Rupert.....	Prince Rupert.
Trail, City of.....	Trail.....	Trail.
Vancouver Granite Co., Ltd.....	744 West Hastings St., Vancouver.....	Nelson Island.
Vernon Granite & Marble Co. (x).....	Box 265, Vernon.....	Yale Dist.
Wilson, James S. (x).....	Sirdar.....	Sirdar.

Limestone

NOVA SCOTIA—		
Eastern Lime Co., Ltd.....	Windsor.....	Windsor.
H. & MacD. Lime Co.....	Windsor.....	Windsor.
Kirkpatrick, Robie.....	Kirkhill.....	Kirkhill.
MacDonald & MacVicar.....	Bailey's Brook.....	Doctors Brook.
Mersey Paper Co., Ltd.....	Liverpool.....	East River.
Montgomery, D. J. (a).....	North River Bridge.....	Meadow.
Mosher, O. P. and Sons.....	Musquodoboit Harbour.....	Musquodoboit Harbour.
North Inverness Lime Crushing Association.....	Grand Etang.....	North Inverness Dist.
N. S. Department of Agriculture.....	Truro.....	Various.
N. S. Department of Highways.....	Halifax.....	Various.
Smiley, Howard (Brooklyn Agricultural Society Ltd.).....	Newport.....	Upper Newport.
NEW BRUNSWICK—		
Brookville Mfg. Co., Ltd.....	Brookville.....	Brookville.
Department of Munitions & Supply.....	Ottawa.....	Various.
Snowflake Lime Ltd.....	3 Pokiok Rd., Saint John.....	Saint John.
St. John Lime Co.....	Brookville.....	Brookville.
QUEBEC—		
Amendements Calcaires de Rivière Bleue Enrg.....	Rivière Bleue.....	Temiscouata Co.
Andorno, Jean (x).....	Cap St. Martin.....	Cap St. Martin.
Babin, Emilien.....	Rivière Caplan.....	Rivière Caplan.
Baillargeon Pacifique.....	St. Lambert.....	Onyers Cliff.
Beaudry, J. Pitro.....	41 rue Taché, Joliette.....	Joliette.
Bélanger, Michel.....	St. Ulric.....	St. Ulric.
Bureau de Reconstruction Economique.....	Quebec.....	Various.
Canada Cement Co., Ltd.....	Box 290, Station B, Montreal.....	Hull and Montreal East.
Canadian Quarries Ltd.....	2251 Chemin de la Côte St. Michel, Ville St. Michel.....	Ville St. Michel.
Carrière Bourbonnais Enrg.....	Dorion.....	Pte. Claire.
Carrière Château Enrg.....	Château Richer.....	Château Richer.

STONE QUARRYING INDUSTRY—Continued

Limestone—Continued

Name	Head office address	Location
QUEBEC—Continued		
Carrière du Cap St. Martin Enrg.	636 Ave. Querbes, Outremont	Cap St. Martin.
Carrière Gravel Ltée	Château Richer	Château Richer.
Carrière de St. Barthelemy Ltée	St. Barthelemy	St. Barthelemy.
Carrière Marcl Ltée	St. Michel Station	St. Clothilde.
Carrière St. Dominique Ltée	9 rue St. Denis, St. Hyacinthe	St. Dominique.
Carrières St. Marc Ltée	St. Marc des Carrières	St. Marc des Carrières.
Carrière St. Maurice Ltée	307 rue Alexandre, Trois Rivières	Champlain Co.
Carrière Trois-Rivières Ltée	St. Louis de France	St. Louis de France.
Carrière Turcotte & Asselin Enrg.	Château Richer	Château Richer.
Charbonneau, Lucien & Co.	St. François-de-Sales	Laval Co.
Chenel, Rev. J. E.	Port Daniel East	Port Daniel East.
Cie de Construction Roberval Ltée	Roberval	Roberval.
Department of Justice	Ottawa	St. Vincent de Paul.
Deraiche, Madame F. X.	Port Daniel	Port Daniel.
Deschambault Quarry Corp. (x)	56 rue St. Pierre, Quebec	Bergerville, St. Marc des Carrières.
Domain Lime Ltd.	Lime Ridge	Lime Ridge.
Drouin, Madame Eva Cimon	Ste. Justine	Ste. Justine.
Dufresne Construction Co., Ltd.	1832 Blvd. Pie IX, Montreal	Rivière des Prairies.
Durocher, Cyrille	11021 Notre Dame E., Montreal E.	Montreal E.
Entreprises Générales Enrg.	28 St. James St. W., Montreal	Montreal.
Faubert, Alphonse	De Lery	De Lery.
Filion, Adéland	Lachute	Lachute.
Fillion, Joseph	200 Notre Dame, Lachine	Lachine.
Fontaine, Omer	St. Maurice	St. Maurice.
Fortin, Camille	Chambord Jet	Chambord.
Fortin, Georges	St. Honoré de Chicoutimi	Chicoutimi.
Fuger & Smith Ltd.	Pointe Claire	Pointe Claire.
Gagné, Eugene (a)	Metabetchouan	Metabetchouan.
Gagnon & Leclerc	St. Joachim	St. Joachim.
Gaspesian Fertilizer Co.	Port Daniel E.	Port Daniel E.
Gauthier, Jos. O., Ltd. (x)	St. Marc des Carrières	St. Marc des Carrières.
Gauthier, René	7652 Henri Julien, Montreal	Bélanger Twp.
Genest, L. G.	St. Bernard	Port Daniel.
Gingras & Frère Ltée (x)	St. Marc des Carrières	St. Marc des Carrières.
Gorman, T. G. Construction Co., Ltd.	1440 St. Catherine St. W., Montreal	Côteau du Lac.
Harrison, George & Cie.	Petit Matane	Matane Co.
Kennedy Construction Co., Ltd.	407 McGill St., Montreal	Actonvale.
Laberge & Marchand.	Châteauguay	Châteauguay.
Lagacé, Nap.	L'Abord-à-Plouffe	St. Martin.
Lakeshore Construction Co.	Pointe-Claire	Pointe-Claire.
Lamothe, Napoléon	Pont Rouge	Pont Rouge.
Langlois, Wilbrod	103 rue St. Pierre, Quebec	Val Brillant.
La Pierre à Chaux Ltée	St. Marc des Carrières	St. Marc des Carrières.
Lapointe, A. & E. (x)	12034 Lachapelle, Montreal	Cartierville.
Lapointe, Emile	St. Dominique, Bagot	St. Dominique.
Larouche, Jean-Bte.	Baie St. Paul	Baie St. Paul.
Lasalle Products Ltd.	159 W. Jean Talon St., Montreal	Ville St. Michel.
Laurentian Stone Co., Ltd.	195 Nicholas St., Ottawa, Ont.	Wrightville.
Leclerc, J. J.	Drapeau	Drapeau.
Leclerc and Robitaille	Roberval	Roberval.
Leroux, L. P.	Beaconsfield.	Beaconsfield.
Lessard, Joseph	St. Joachim	St. Joachim.
Levesque, Armand	Roberval	Roberval.
Levesque & Langlois (a)	Rivière-Bleue	Temiscouata.
Martineau Fils Ltée (x)	517 Marie-Anne E., Montreal	Pont Viau, Montreal.
Mercure, C.	9 rue St-Denis, St. Hyacinthe	Bagot Co.
Miner, R. H. Co., Ltd.	719 Sun Life Bldg., Montreal	St. Laurent.
National Quarries Ltd.	6301 Park Ave., Montreal	Côte St-Michel.
Noel, Oscar	64 Montcalm Ave., Hull	Wrightville.
O'Connors Inc.	Huntingdon	Huntingdon Co.
Quimet, Eugène	St. Jean	St. Jean.
Paquette, Levis & Cie (x)	Cap St. Martin	Cap St. Martin.
Paquin, Laurent	1043 Blvd. des Forges, Three Rivers	St. Marc des Carrières.
Pearson, Honore	Port Daniel Station	Bonaventure Co.
Pelletier, Joseph E.	Ste-Anne des Monts	Ste-Anne des Monts.
Pierre à Chaux Ltée	St. Marc des Carrières	St. Marc des Carrières.
Quebec Department of Highways	Quebec	Various.
Rousseau, T. E.	105 Côte de la Montagne, Quebec	Val Brillant.
St. Francis Rock Products and Equipment Ltd.	8050 Bloomfield Ave., Montreal	St. Laurent Parish.
St. Laurent Quarry Ltd.	Ville St. Laurent	Laval Co.
St. Laurent Stone Products & Supplies Ltd.	8050 Bloomfield Ave., Montreal	Côte Ste. Marguerite.
St. Michel Lime Co.	7805 Blvd. St. Michel, Montreal	Montreal.
Shawinigan Chemicals Ltd.	Box 6072, Montreal	Bedford.
Société des Agriculteurs de Lévis	249 rue St. Georges, Lévis	Lévis.
Standard Clay Products Ltd.	Box 189, St. Johns	St. Johns.
Standard Lime Co., Ltd.	Joliette	St. Paul de Joliette.
Syndicat de Broyage de Lévis	R. R. 1, St. Joseph de Lévis	Ville Lauzon.
Tessier, S.	174 Laurier St., Hull	Hull Twp.
Trappist Fathers	Village des Pères	Village des Pères.
Stone & Quarry Ltd (x)	8013 rue St. Denis, Montreal	St-François de Sales.
Syndicat de Broyage de Lévis	Lévis	Lévis.

STONE QUARRYING INDUSTRY—Continued

Limestone—Concluded

Name	Head office address	Location
QUEBEC—Concluded—		
Tremblay, Napoléon.....	32 rue Joffre, Hull.....	Hull.
Trudel, Nap. & Fils.....	St. Irénée.....	Charlevoix Co.
Union des Carrières & Pavages Ltée.....	48 Second Ave., Quebec.....	Charlesbourg W.
Valleyfield, City of.....	Valleyfield.....	New Salaberry.
Varin, Joseph.....	8128 Blvd., St. Michel.....	St. Michel.
Verreault, E., Ltd. (x).....	194 rue du Pont, Quebec.....	Giffard.
Villeneuve, François.....	Pointe-au-Pic.....	Pointe-au-Pic.
ONTARIO—		
Brunner, Mond Canada, Ltd.....	Bank of Commerce Bldg., Toronto.....	Essex Co.
Canada Cement Co., Ltd.....	Box 290, Station B, Montreal, Que.....	Belleville.
Canada Crushed Stone Ltd.....	Sun Life Bldg., Hamilton.....	W. Flamboro Twp.
Code, W. H.....	Smith Falls.....	Hagersville.
Coldwater Crushed Stone Ltd.....	Coldwater.....	Various.
Collingwood, Town of.....	Collingwood.....	Simcoe Co.
Cook, J. S. (x).....	Warton.....	Collingwood.
Curran and Briggs Ltd.....	203 Manning Chambers, Toronto.....	Bruce Co.
Foster, R. R.....	86 Spadina Ave., Ottawa.....	Larchwood.
Gow, James (a).....	Fergus.....	Nepean Twp.
Gypsum, Lime & Alabastine Canada Ltd.....	Paris.....	Fergus.
Hagersville Quarries Ltd.....	Hagersville.....	Hespeler, Beachville and Milton.
Haldimand Quarries & Construction Ltd.....	137 Wellington St. W., Toronto.....	Hagersville.
Hicks, Wm. & Son (a).....	Owen Sound.....	Hagersville.
Inniskip Quarries Ltd.....	445 Fleet St. W., Toronto.....	Owen Sound.
Jamieson Lime Co.....	Renfrew.....	Inniskip.
Kingston Penitentiary (x).....	Department of Justice, Ottawa.....	Horton Twp.
Kirby Bros. Supply Co., Ltd.....	215 Sussex St., Ottawa.....	Portsmouth.
Kirkfield Crushed Stone Ltd.....	445 Fleet St. W., Toronto.....	Gloucester Twp.
Lapierre, M. C.....	1949 8th Ave. E., Owen Sound.....	Kirkfield.
Law, R. E., Crushed Stone Ltd.....	Port Colborne.....	Owen Sound.
Limestone Products Ltd.....	406 Metropolitan Bldg., Toronto.....	Port Colborne.
Longford Quarries Ltd.....	Sun Life Bldg., Hamilton.....	N. Orillia Twp.
McGinnis & O'Connor.....	King St. E., Kingston.....	Longford Mills.
Noranda Mines Ltd.....	1600 Royal Bank Bldg., Toronto.....	Barriefield.
North American Cyanamid Ltd.....	Royal Bank Bldg., Toronto.....	Haileybury.
Ontario Department of Highways.....	Parliament Buildings, Toronto.....	Beachville.
Ontario Reformatory.....	Parliament Buildings, Toronto.....	Various.
Ontario Rock Co., Ltd.....	18 Grenville St., Toronto.....	Guilph.
Pembroke, Corp. of.....	Pembroke.....	Belmont and Methen Twp.
Pirson, John.....	Stevensville.....	Pembroke.
Queenston Quarries Ltd. (x).....	76 Sun Life Bldg., Hamilton.....	Bertie Twp.
Ritchie Cut-stone Co., Ltd.....	250 Madison Ave., Toronto.....	St. Davids.
Routly Construction Co., Ltd.....	21 Dundas Sq., Toronto.....	Erin Twp.
Walker Bros.....	Box 586, Thorold.....	Leeds Co.
Wehman, John.....	88 Pine St., Kingston.....	Stamford Twp.
White Valley Chemicals Ltd.....	809 Lumsden Bldg., Toronto.....	Kingston Twp.
MANITOBA—		
Gillis Quarries Ltd.....	Richards & Spruce Sts., Winnipeg.....	Bobcaygeon.
Manitoba Department of Highways.....	Winnipeg.....	Garson and Stonewall.
Tyndall Quarry Co., Ltd. (x).....	1591 Erin St., Winnipeg.....	Various.
Winnipeg, City of.....	Winnipeg.....	Garson.
Winnipeg Supply & Fuel Co., Ltd.....	812 Boyd Bldg., Winnipeg.....	Stony Mountain.
ALBERTA—		
Loder's Lime Co., Ltd.....	Kananaskis.....	Moosehorn.
Summit Lime Works Ltd.....	Box 273, Lethbridge.....	Stonewall.
BRITISH COLUMBIA—		
Agostinelli & Vannuchi.....	957 Rossland Ave., Trail.....	Fife.
Beale Quarries Ltd.....	744 West Hastings St., Vancouver.....	Van Anda.
B. C. Department of Highways.....	Victoria.....	Various.
B. C. Pulp & Paper Co., Ltd.....	Bank of Nova Scotia Bldg., Vancouver.....	Quatsino M.D.
Christensen, P. (Koeys Lime Quarries).....	Namu.....	Namu.
Consolidated Mining & Smelting Co. of Canada Ltd. (a).....	Trail.....	Proctor.
Deeks Sand & Gravel Co., Ltd.....	101 W. 1st Ave., Vancouver.....	Seymour Creek, Coquitlam.
Fernie, City of.....	Fernie.....	near Fernie.
Pacific Lime Co., Ltd.....	744 Hastings St. W., Vancouver.....	Texada Island.
Reynolds, H.....	2475 Charles St., Vancouver.....	Hope.
Richmond, Geo. W. & Co.....	3239 W. King Ave., Vancouver.....	Vancouver.
Trail, City of.....	Trail.....	Trail.

Marble

QUEBEC—		
Canada Marble & Lime Co., Ltd.....	74 Blvd. Levesque, L'Abord-à-Plouffe.....	L'Annonciation.
Missisquoi Stone & Marble Co., Ltd. (x).....	Phillipsburg.....	Phillipsburg.
White Grit Co.....	Hurdman Road, Ottawa, Ont.....	Portage du Fort.

DOMINION BUREAU OF STATISTICS

STONE QUARRYING INDUSTRY—Concluded

Marble—Concluded

Name	Head office address	Location
ONTARIO—		
Bolender Bros. (White Star Mine) (a).....	Haliburton.....	Haliburton.
Bonter Marble & Calcium Co., Ltd.....	Box 61, Marmora.....	Marmora Twp.
Connolly Marble, Mosaic & Tile Co., Ltd.....	316 Dupont St., Toronto.....	Madoc Twp.
Orser, S. H. (x) (a).....	Verona.....	Verona.
Silvertone Black Marble Quarries Ltd.....	305 O'Connor St., Ottawa.....	St. Albert.
Stockloser, Karl.....	Madoc.....	Eldorado.
ALBERTA—		
Couch, E. J.....	502 .. 9th St. N.E., Calgary.....	Radnor.
BRITISH COLUMBIA—		
Marble & Associated Products.....	507 Ellice St., Victoria.....	Malahat.

Sandstone

NOVA SCOTIA—		
Fairview Crushed Stone Co., Ltd.....	637 Gottingen St., Halifax.....	Halifax.
N. S. Department of Highways.....	Halifax.....	Various.
Stanley Tools.....	New Britain, Conn., U.S.A.....	Pictou Co.
Wallace Quarries Ltd. (x).....	Wallace.....	Wallace.
NEW BRUNSWICK—		
Read Stone Co., Ltd (x) (a).....	Sackville.....	Stonehaven.
Smith, E. A. (x).....	Shediac.....	Shediac.
QUEBEC—		
Blais, Jos.....	32 Mont-Marie, Lévis.....	St. Romuald.
Deschambault Quarry Corp.....	Bergerville.....	Bergerville.
Gagnon, L. P.....	St. David.....	St. David.
La Cie d'Entreprises Gaspésiennes Ltd.....	Mont Joli.....	Grand Remou.
Ouellet & Cie.....	rue St. Jérôme, Matane.....	Matane.
Pageot and Bouchard.....	Everall.....	Ste. Foy.
Quebec Department of Highways.....	Quebec.....	Various.
Rousseau, T. E.....	105 Côte de la Montagne, Quebec.....	New Carlisle.
Roy and Côté.....	Cap Chat.....	Gaspé Co.
Sherbrooke, City of.....	Sherbrooke.....	Sherbrooke.
Simard, A.....	Pointe au Pic.....	Pointe au Pic.
Vézina Quarry (x).....	Ste-Foy.....	Ste-Foy.
ONTARIO—		
Campbell Sandstone Quarries Ltd. (x).....	163 Main St., Westboro.....	Nepean Twp.
Mountain Sandstone Quarry.....	Box 306, Georgetown.....	Esquesing Twp.
Norton, A. W.....	Limehouse.....	Limehouse.
Sykes, Thos.....	Georgetown.....	Glen Williams.
ALBERTA—		
Oliver, Win.....	Cochrane.....	Cochrane.
BRITISH COLUMBIA—		
Canadian Pacific Railways.....	Montreal.....	Revelstoke.
Consolidated Mining & Smelting Co., Ltd....	Trail.....	Kimberley.
McDonald, J. A. & C. H., Ltd. (x).....	1571 Main St., Vancouver.....	Haddington Is.

Slate

QUEBEC—		
Broughton Soapstone & Quarry Co. (a).....	Broughton Station.....	Ste-Thérèse Twp.
Williamson & Crombie.....	Kingsbury.....	Kingsbury.
ONTARIO—		
Canada Slate Products Ltd.....	11 King St. W., Toronto.....	Toronto.
BRITISH COLUMBIA—		
Brown, O. M.....	1903 Lansdowne Rd., Victoria.....	Kapoor.
Richardson, Geo. W.....	3239 West King Edward Ave., Vancouver....	Howe Sound.

CONTRACT DIAMOND DRILLERS, 1941

Contract—

Name of Firm

Head Office Address

Anderchek, J. M.	210 Mountjoy St. S., Timmins, Ont.
Anderson, Anton	20 Patricia Blvd., Timmins, Ont.
Arno Diamond Drilling Co., Ltd.	16½ Pine S. N., Timmins, Ont.
Baderski, Frank & Son	Schumacher Road, Timmins, Ont.
Baker and Baker*	Val d'Or, Que.
Boyles Bros. Drilling Co., Ltd.	1291 Parker St., Vancouver, B.C.
Boyles Bros. Drilling (Eastern) Ltd.	1291 Parker St., Vancouver, B.C.
Burton, Archie S.	352 Howey Cres., Sudbury, Ont.
Connors, T., Diamond Drilling Co., Ltd.	744 W. Hastings St., Vancouver, B.C.
Continental Diamond Drilling Co., Ltd.	Rouyn, Que.
Demorest Drilling Ltd.	Noranda, Que.
Dubenski Diamond Drilling	19 Regina Ave., Kenora, Ont.
Heath & Sherwood	6 Duncan Ave., Kirkland Lake, Ont.
Inspiration Mining & Development Co., Ltd.	Amos, Que.
Johnson, W. R. G., and Ellis, Chas. R.*	Hearst, Ont.
Kuntz, Harry J.	McKenzie Island, Ont.
Labine Bros.	McKenzie Island, Ont.
Lantz Diamond Drilling Co., Ltd.	Red Lake, Ont.
Larocque, T. E.	10 rue Frontenac, Val d'Or, Abitibi, Que.
Marks & Erikson*	Quyon, Que.
McIsaac, R. M.	Flin Flon, Man.
Morissette, N., Diamond Drilling Ltd.	Box 440, Haileybury, Ont.
Moulton, E.	Prescott, Ont.
Mumford, Medland, Ltd.*	576 Wall St., Winnipeg, Man.
Ontario Diamond Drilling Co., Ltd.	203 Mackey Bldg., Sudbury, Ont.
Prospect Drilling & Development Co., Ltd.*	152 Highbourne Rd., Toronto, Ont.
Robinson Contracting Co., Ltd.	850 Hastings St. W., Vancouver, B.C.
Ryan Diamond Drilling Co., Ltd.	217 Spruce St. S., Timmins, Ont.
Smith, Oscar R., Diamond Drilling Co., Ltd.*	443 Howey Crescent, Sudbury, Ont.
Smith & Travers Co., Ltd.	208 Walnut St., Sudbury, Ont.
Sprague & Henwood Ltd.	227 Oak St. W., North Bay, Ont.
Sudbury Diamond Drilling Co., Ltd.	510 Montreal Trust Bldg., 67 Yonge St., Toronto, Ont.
Vancouver Island Drilling & Exploration Co., Ltd.	604 Bank of Toronto Bldg., Victoria, B.C.

* No operations in 1941.

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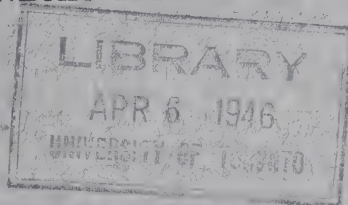
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CANADA—DEPARTMENT OF TRADE AND COMMERCE
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT
ON THE
MINERAL PRODUCTION OF
CANADA

DURING THE CALENDAR YEAR

1941



Published by Authority of the Hon. James A. MacKinnon, M.P.,
Minister of Trade and Commerce



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1943

Price, 50 cents

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PREFACE

Annual reports on the Mineral Production of Canada have been published since 1886. The first reports were published by the Geological Survey of Canada, later by the Mines Branch of the Department of Mines, and since 1921 by the Dominion Bureau of Statistics.

The present report contains final data on the production of Canada's mines, together with details of capital employed in this major primary Canadian industry, salaries and wages paid, the number of employees on the surface and underground, the amounts expended on fuel and power and the power producing equipment installed, and the process supplies purchased.

Owing to the secret nature and strategic importance of much of the information in this report, it has been decided to withhold it from general distribution until after hostilities have ceased, but to preserve continuity of record it was considered advisable to have it printed.

It will be noted that no figures on imports or exports are included as has been the custom in former years. The figures will be made available by the External Trade Branch of the Bureau after the war and some saving in printing costs is achieved by their omission here.

It has been the practice for years to include in this report world production tables of all important minerals. No figures on world production have been available since 1939. These world tables will be published again when world censorship regulations are lifted.

As in previous years, the Bureau co-operated with the Mines Department of the provinces of Nova Scotia, Quebec, Ontario, Saskatchewan and British Columbia in the collection of these statistics. Forms are filled out in duplicate by the reporting companies, thereby saving the operator extra work and resulting in uniform totals for Dominion and Provincial statistical bureaux.

The thanks of the Bureau are tendered to the mine and smelter operators for assistance given and information made available. Railway and other transportation companies as well as smelter operators outside of Canada have also furnished data, the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. W. H. Losee, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch, by Mr. R. J. McDowall, B.Sc., Mining Statistician.

S. A. CUDMORE,

Dominion Statistician.

DOMINION BUREAU OF STATISTICS,
OTTAWA, June 23, 1943.

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DOMINION BUREAU OF STATISTICS

S. A. CUDMORE, M.A. (Oxon.), F.S.S., F.R.S.C., Dominion Statistician

W. H. LOSEE, B.Sc., Chief of the Mining, Metallurgical and Chemical Branch

R. J. McDOWALL, B.Sc., Statistician, Mining, Metallurgical and Chemical Branch

ANNUAL REPORT

ON THE

MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR 1941

CHAPTER ONE

In 1941 the total value of Canadian mineral production attained an all-time high of \$560,241,290 as compared with \$529,825,035 in 1940. Increases in the total values of output over the preceding year were realized by all the major groups comprising the mining industry. The value of metals and metalliferous ores produced in 1941 amounted to \$395,346,581; fuels and other non-metallic minerals totalled \$119,521,437, while shipments of clay products, stone, lime and various other structural materials of mineral origin were evaluated at \$45,373,272.

During 1941 the Dominion entered its third year of the war as a member of the British Commonwealth and Allied Nations in their struggle against world domination by the Totalitarian States. During the summer of 1941, Russia was invaded by the armies of Germany, and in December, Canada and the other members of the British Commonwealth declared war on Japan. This action followed the treacherous attack by Japan on the United States, British and Dutch possessions in the Pacific. The war was now truly global in extent and the resulting increase in demand for materials essential to the allied war effort was reflected in almost every sphere of Canadian life.

The mining industry responded to the demand by increasing output of metalliferous ores. Smelters and refineries were enlarged to handle this expanded output and every encouragement was given to the development of deposits containing minerals necessary for the manufacture of munitions and war equipment or the construction of airports and other war-time projects. Plans were formulated for the production in Ontario during 1942 of metallic magnesium, the concentration of tungsten minerals, particularly from gold ores, was stimulated, and at Trail, B.C., refined tin was produced for the first time in the Dominion from Canadian ores.

In order to increase the production of wartime metals, Parliament in the 1942 session provided a three-year exemption from the excess profits tax for the profits of any company derived from the operation of any base metal or strategic mineral mine coming into production in the three years following after January 1, 1943.

An amendment was also made in 1942 to the Income War Tax Act, designed to encourage prospecting for strategic minerals.

The duty of organizing and mobilizing the resources of Canada for war purposes is now vested in the Minister of Munitions and Supply, who is accordingly empowered to mobilize, control, regulate or restrict any branch of trade and industry. He exercises his authority principally through the Controllers. A Steel Controller was appointed in June, 1940, and in July the prices of iron and steel were frozen. The supply, distribution and use of all non-ferrous metals, industrial minerals and common metal alloys are administered by the Metals Controller. Coal and coke are now under the supervision of the Coal Administrator of the Wartime Prices and Trade Board; an Oil Controller was appointed in June, 1940 to conserve gasoline and fuel oil, and in the same year controllers of Hydro-electric power and timber were also appointed.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1941

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
METALLICS						
Antimony.....	lb.					
Arsenic (As ₂ O ₃).....	lb.			2,056,000	1,482,000	
	\$			89,024	64,171	
Bismuth.....	lb.				7,499	
	\$				10,379	
Cadmium.....	lb.					61,085
Chromite.....	ton			2,372		71,714
	\$			42,679		
Cobalt.....	lb.				263,257	
	\$				255,904	
Copper.....	lb.			143,783,978	333,829,767	67,018,563
	\$			14,502,052	33,192,644	6,759,492
Gold.....	fine oz.	19,170		1,089,339	3,194,308	150,553
	\$	738,045		41,939,552	122,980,858	5,796,290
Iron ore.....	ton				516,037	
	\$				1,426,057	
Lead.....	lb.				1,622,823	
	\$				54,559	
Magnesium.....	lb.					
	\$					
Manganese ore.....	ton					
Manganese metal.....	lb.	7,500				
	\$	2,250				
Mercury.....	lb.					
	\$					
Molybdenite (concentrates).....	lb.			196,600		
	\$			88,470		
Nickel.....	lb.				282,258,235	
	\$				68,656,795	
Palladium, rhodium, iridium, etc.....	fine oz.				97,432	
	\$				3,396,304	
Platinum.....	fine oz.				124,257	
	\$				4,747,860	
Radium products.....	\$					
Selenium.....	lb.				142,498	32,179
	\$			203,162	272,171	61,462
Silver.....	fine oz.	673		388,039	4,977,476	966,105
	\$	257		1,657,082	1,904,432	369,641
Tellurium.....	lb.			634,016	11,453	
	\$				18,394	
Titanium ore.....	ton			12,651		
	\$			49,110		
Tin.....	lb.					
	\$					
Tungsten (concentrates).....	lb.			989	3,830	
	\$			627	2,432	
Zinc.....	lb.			46,389,581	1,100,949	34,879,239
	\$			1,582,349	37,553	1,189,731
Total Metallics.....	\$	740,552		59,315,918	237,020,513	14,248,330
NON-METALLICS						
FUELS						
Coal.....	ton	7,387,762	523,344			1,246
	\$	28,446,204	2,021,394			3,411
Natural gas.....	M cu. ft.		653,542		11,828,703	
	\$		317,437		7,140,130	
Peat for fuel.....	ton				355	
	\$				2,155	
Petroleum, crude.....	brl.		31,359		160,238	
	\$		44,102		337,760	
Total Fuels.....	\$	28,446,204	2,382,933		7,480,045	3,411

Employment in the mining industry showed eight monthly increases in 1941, resulting in the greatest volume of employment in the twenty-one years of the record. In coal mining the index averaged 94.8 or a few points above the 1940 figure of 91.3. Employment generally in the extraction of metallic ores reached a new high level in 1941 and the non-metallic mining industries other than coal provided more employment in 1941 than in any earlier year since 1920.

The manufacture of war equipment, as an auxiliary operation in mining plants, was expanded in 1941, closer cooperation between management and labour was evidenced, and the year under review witnessed the approach of a full-out effort by the entire mining industry to contribute its share in assuring an early and complete Allied victory.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1941

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
METALLICS						
Antimony.....lb.			3,185,077			3,185,077
\$			445,911			445,911
Arsenic (As ₂ O ₃).....lb.						3,538,000
\$						153,195
Bismuth.....lb.			12			7,511
\$			17			10,396
Cadmium.....lb.	108,832		1,081,374			1,251,291
\$	127,769		1,269,533			1,469,016
Chromite.....ton						2,372
\$						42,679
Cobalt.....lb.						263,257
\$						255,904
Copper.....lb.	32,324,512		66,327,166	32,727		643,316,713
\$	3,260,250		6,689,768	3,301		64,407,497
Gold.....fine oz.	138,015	215	608,203	74,417	70,959	5,345,179
\$	5,313,578	8,277	23,415,816	2,865,054	2,731,922	205,789,392
Iron ore.....ton						516,037
\$						1,426,057
Lead.....lb.			456,840,454		1,703,728	460,167,005
\$			15,358,976		57,280	15,470,815
Magnesium.....lb.			(a) 10,905			10,905
\$			2,944			2,944
Manganese ore.....ton						
\$						7,500
Manganese metal.....lb.						2,250
\$						536,304
Mercury.....lb.			536,304			1,335,697
\$			1,335,697			196,600
Molybdenite (concentrates).....lb.						88,470
\$						282,258,235
Nickel.....lb.						68,656,795
\$						97,432
Palladium, rhodium, iridium, etc.. fine oz.						3,396,304
\$						124,317
Platinum.....fine oz.			60			4,750,153
\$			2,293			925,196
Radium products.....lb.				925,196		406,930
Selenium.....lb.	29,091					777,236
\$	55,564					21,754,408
Silver.....fine oz.	2,047,154	21	11,233,788	15,327	856,772	8,323,454
\$	783,266	8	4,298,160	5,864	327,810	11,453
Tellurium.....lb.						18,394
\$						12,651
Titanium ore.....ton						49,110
\$						64,744
Tin.....lb.			64,744			33,667
\$			33,667			82,846
Tungsten (concentrates).....lb.			34,495	41,972	1,560	33,712
\$			21,453	13,220	980	512,881,636
Zinc.....lb.	62,142,288		367,869,579			17,477,337
\$	2,119,673		12,548,031			
Total Metallics.....\$	11,660,100	8,285	65,422,256	3,812,635	3,117,992	395,346,581
NON-METALS						
FUELS						
Coal.....ton	1,322,763	6,969,962	2,020,844			18,225,921
\$	1,713,478	19,382,471	6,492,672			58,059,630
Natural gas.....M cu. ft.	106,168	30,905,440		1,500		43,495,353
\$	31,850	5,175,364		335		12,665,116
Peat for fuel.....ton						355
\$						2,155
Petroleum, crude.....bbl.		9,018,577		23,664		10,133,838
\$		13,985,906		47,328		14,415,096
Total Fuels.....\$	1,745,328	38,543,741	6,492,672	47,663		85,141,997

(a) Powder.

Table 1.—Finally Revised Figures on the Mineral Production of Canada, by Provinces, 1941—Continued

	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
Other Non-Metallic and Industrial Minerals						
Asbestos.....ton						477,846
	\$					21,468,840
Barytes.....ton			228			6,890
	\$		1,140			74,416
Diatomite.....ton			105			344
	\$		2,625			9,935
Feldspar.....ton						26,040
	\$					244,284
Fluorspar.....ton						5,534
	\$					97,767
Garnets (rock).....ton						16
	\$					160
Graphite.....ton						132,924
Grindstones (includes pulpstones, etc.).....ton						188
	\$					11,500
Gypsum.....ton			23,862			1,593,406
	\$		141,320			2,248,428
Iron oxides (ochre).....ton			275			10,045
	\$		2,884			142,069
Magnesitic dolomite.....ton						831,041
Magnesium sulphate.....ton			265			265
	\$		7,343			7,343
Mica.....lb.			297,000			3,487,891
	\$		3,678			335,288
Mineral waters.....Imp. gal.						181,064
	\$					72,531
Nepheline syenite.....ton						227,553
Peat moss.....ton		421	14,345			27,803
	\$	5,055	390,509			644,253
Phosphate.....ton						2,487
	\$					33,376
Quartz.....ton	(x) 148,208		631			2,052,878
	\$	51,873	1,579			1,366,187
Salt.....ton		16,617				560,845
	\$	260,995				3,196,165
Silica brick.....M						4,111
	\$					238,433
Soapstone (including talc).....ton						155,925
Sodium carbonate.....ton						186
	\$		1,488			1,488
Sodium sulphate.....ton	115,600	8				115,608
	\$	931,522	32			931,554
Strontium minerals.....ton						27
	\$					280
Sulphur.....ton			103,140			260,023
	\$		1,026,794			1,762,786
Talc.....ton						18,171
	\$					204,884
Total Other Non-Metals... \$	983,395	266,082	1,579,360			34,379,440
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS						
CLAY PRODUCTS						
Clay—						
Bentonite.....ton		1,317	95			2,172
	\$	5,882	618			7,830
Fireclay.....ton	18,885		795			22,995
	\$	35,217	10,728			57,100
Kaolin.....ton						2
	\$					30
Other clay.....ton	3,289		70			4,056
	\$	10,826	183			13,182
Fireclay blocks and shapes.....ton	153,890		30,736			190,497
Firebrick.....M		60	3,572			3,643
	\$	3,227	180,175			183,897
Brick—						
Soft and mud process—						
Face.....M		255				14,288
	\$	6,120				285,260
Common.....M		2,537	4,126			30,664
	\$	33,234	72,825			455,385
Stiff mud process (wire cut)—						
Face.....M	119	145	301			52,419
	\$	2,727	9,493			1,218,632
Common.....M	750	2,283	2,998			69,750
	\$	6,925	50,587			1,043,832

(x) Includes low grade fluxing sand.

Table 1.—Finally Revised Statistics on the Mineral Production of Canada, by Provinces, 1941—Concluded

		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
Brick— <i>Concluded</i>						
Dry press—						
Face.....	M			2,931	11,204	
	\$			83,587	257,006	
Common.....	M			11,319	4,750	
	\$			223,550	77,605	
Fancy or ornamental brick (including special shapes embossed and enamelled brick).....	M				36	
	\$				2,100	
Sewer brick.....	M			230	414	
	\$			2,530	7,749	
Paving brick.....	M				120	
	\$				7,312	
Structural tile—						
Hollow blocks (including fireproofing and load bear- ing tile).....	ton	10,240	3,366	37,765	55,771	400
	\$	95,400	26,857	335,142	512,430	4,227
Roofing tile.....	\$				552	
Floor tile (quarries).....	\$				21,135	
Drain tile.....	M	157	65	917	9,827	
	\$	5,408	1,946	37,860	225,334	
Sewer pipe (including copings, flue linings, etc.).....	\$	331,042	3,783	172,530	480,036	
Pottery, glazed or unglazed (including coarse earthen- ware, stoneware, flower pots and all other pottery)...	\$		37,277	13,921	46,670	
Other products.....	\$				5,337	
Total Clay Products.....	\$	529,435	193,643	1,944,358	3,087,616	84,817
OTHER STRUCTURAL MATERIALS						
Cement.....	brl.			4,048,749	2,748,854	576,648
	\$			5,798,188	4,019,656	1,274,392
Lime (b)—						
Quicklime.....	ton	20,789	14,539	245,814	373,927	21,444
	\$	198,057	122,797	1,791,604	2,649,304	174,624
Hydrated lime.....	ton	152	7,213	60,701	57,198	5,656
	\$	1,520	57,336	271,140	597,344	98,868
Total lime.....	ton	20,941	21,752	306,515	431,125	27,100
	\$	199,577	180,133	2,062,744	3,246,648	273,492
Sand and gravel.....	ton	749,441	962,483	11,681,390	11,569,382	1,503,901
	\$	332,531	423,772	2,673,300	4,524,463	429,996
Stone—						
Granite.....	ton	410	1,529	316,372	152,426	244
	\$	30,537	63,184	866,182	388,325	4,155
Limestone (b).....	ton	46,973	131,941	3,370,875	3,353,856	38,103
	\$	69,501	274,000	2,567,422	2,832,056	60,743
Marble.....	ton			10,809	6,540	
	\$			92,916	30,365	
Sandstone.....	ton	66,219	4,678	76,928	13,420	
	\$	169,307	10,680	82,701	27,190	
Slate.....	ton			346		
	\$			346		
Total stone.....	ton	113,602	138,148	3,775,330	3,526,242	38,347
	\$	269,345	347,864	3,609,567	3,277,936	64,898
Total Other Structural Materials.....	\$	801,453	951,769	14,143,799	15,068,703	2,042,778
Grand Total.....	\$	32,569,867	3,690,375	99,651,044	267,435,727	16,689,867
Metallics.....	\$	740,552		59,315,918	237,020,513	14,248,330
Fuels.....	\$	28,446,204	2,382,933		7,480,045	3,411
Other Non-Metallics.....	\$	2,052,223	162,030	24,246,969	4,778,850	310,531
Clay Products.....	\$	529,435	193,643	1,944,358	3,087,616	84,817
Other Structural Materials.....	\$	801,453	951,769	14,143,799	15,068,703	2,042,778
Grand Total 1941.....	\$	32,569,867	3,690,375	99,651,044	267,435,727	16,689,867
Per cent of total.....		5.81	0.66	17.79	47.74	2.98
Grand Total 1940.....	\$	33,318,587	3,435,916	86,313,491	261,483,349	17,828,522
Grand Total 1939.....	\$	30,746,200	3,949,433	77,335,998	232,519,948	17,137,930

(b) Includes relatively large quantities used as a chemical.

Table 1.—Finally Revised Statistics on the Mineral Production of Canada, by Provinces
1941—Concluded

	Saskat- chewan	Alberta	British Columbia	Northwest Territories	Yukon	Canada
Brick— <i>Concluded</i>						
Dry press—						
Face..... M	52	1,250	184			15,621
Common..... M	1,212	13,951	8,152			363,906
	\$	8,971	409			25,449
	\$	78,813	6,129			386,097
Fancy and ornamental brick (including special shapes embossed and enamelled brick)..... M						36
	\$					2,100
Sewer brick..... M						644
	\$					10,279
Paving brick..... M						120
	\$					7,312
Structural tile—						
Hollow blocks (including fireproofing and load bearing tile)..... ton	1,625	6,656	1,707			117,530
	\$	13,700	20,588			1,063,129
Roofing tile.....			198			750
Floor tile (quarries).....			214			21,349
Drain tile..... M	15	242	1,096			12,319
	\$	400	53,871			333,364
Sewer pipe (including copings, flue linings, etc.).....	\$	325,773	109,225			1,422,389
Pottery, glazed or unglazed (including coarse earthenware, stoneware, flower pots and all other pottery).....	\$	401,114	3,230			502,212
Other products.....	\$		1,474			6,811
Total Clay Products.....	\$	224,897	558,426			7,575,336
OTHER STRUCTURAL MATERIALS						
Cement..... brl		492,515	501,945			8,368,711
	\$	985,030	986,322			13,063,588
Lime (b)—						
Quicklime..... ton		17,276	30,075			723,864
	\$	144,556	206,769			5,287,711
Hydrated lime..... ton		674	5,427			137,021
	\$	6,740	37,282			1,070,230
Total lime..... ton		17,950	35,502			860,885
	\$	151,296	244,051			6,357,941
Sand and gravel..... ton	1,220,801	956,484	2,960,924			31,604,806
	\$	406,835	1,151,322			10,375,723
Stone—						
Granite..... ton			129,941			600,922
	\$		146,403			1,498,786
Limestone (b)..... ton		7,942	201,359			7,151,049
	\$	24,303	229,702			6,057,727
Marble..... ton			300			17,649
	\$		2,800			126,081
Sandstone..... ton			8,640			169,885
	\$		15,650			305,528
Slate..... ton			950			1,296
	\$		12,216			12,562
Total stone..... ton		7,942	341,190			7,940,801
	\$	24,303	406,771			8,000,684
Total Other Structural Materials.....	\$	406,835	1,594,133	2,788,466		37,797,936
Grand Total.....	\$	15,020,555	41,364,385	76,841,180	3,860,298	560,241,290
Metallics.....	\$	11,660,100	8,285	65,422,256	3,812,635	395,346,581
Fuels.....	\$	1,745,328	38,543,741	6,492,672	47,663	85,141,997
Other Non-Metallics.....	\$	983,395	266,082	1,579,360		34,379,440
Clay Products.....	\$	224,897	952,144	558,426		7,575,336
Other Structural Materials.....	\$	406,835	1,594,133	2,788,466		37,797,936
Grand Total 1941.....	\$	15,020,555	41,364,385	76,841,180	3,860,298	560,241,290
Per cent of total.....		2.68	7.38	13.72	0.69	100.00
Grand Total 1940.....	\$	11,505,858	35,092,337	74,134,485	2,594,157	529,825,035
Grand Total 1939.....	\$	8,794,090	30,691,617	65,216,745	3,248,777	474,602,059

Table 2.—Quantities and Values of Mineral Products from Canadian Sources, 1940 and 1941

		1940*		1941	
		Quantity	Value	Quantity	Value
METALLICS					
Antimony.....	lb.	2,594,492	\$ 396,468	3,185,077	\$ 445,911
Arsenic (As ₂ O ₃).....	lb.	2,093,275	62,798	3,538,000	153,195
Bismuth.....	lb.	58,529	81,004	7,511	10,396
Cadmium.....	lb.	908,127	1,056,152	1,251,291	1,469,016
Chromite.....	tons	335	5,780	2,372	42,679
Cobalt.....	lb.	794,359	1,235,220	263,257	255,904
Copper.....	lb.	655,593,441	65,773,061	643,316,713	64,407,497
Gold valued at standard rate.....	fine oz.	5,311,145	109,791,107	5,345,179	110,494,653
Estimated exchange equalization on gold produced.....			94,687,976		95,294,739
Iron ore.....	tons	414,603	1,211,305	516,037	1,426,057
Lead.....	lb.	471,850,256	15,863,605	460,167,005	15,470,815
Magnesium.....	lb.			10,905	2,944
Manganese ore.....	tons	152	4,315		
Manganese metal.....	lb.			7,500	2,250
Mercury.....	lb.	153,830	369,317	536,304	1,335,697
Molybdenite concentrates.....	lb.	22,251	10,280	196,600	88,470
Nickel.....	lb.	245,557,871	59,822,591	282,258,235	68,656,795
Palladium, rhodium, iridium, etc.....	fine oz.	91,522	3,520,746	97,432	3,396,304
Platinum.....	fine oz.	108,486	4,240,362	124,317	4,750,153
Radium products.....	(a)		410,176	(a)	925,196
Selenium.....	lb.	179,860	343,533	406,930	777,236
Silver.....	fine oz.	23,833,752	9,116,172	21,754,408	8,323,454
Tellurium.....	lb.	3,491	5,607	11,453	18,394
Tin.....	lb.			64,744	33,667
Titanium ore.....	tons	4,535	24,510	12,651	49,110
Tungsten concentrates.....	lb.	12,002	7,303	82,846	38,712
Zinc.....	lb.	424,028,862	14,463,624	512,381,636	17,477,337
Total.....			382,503,012		395,346,581
NON-METALLICS—FUELS					
Coal.....	tons	17,566,884	54,676,993	18,225,921	58,059,630
Natural gas.....	M cu. ft.	41,232,125	13,000,593	43,495,353	12,665,116
Peat.....	tons	30	75	355	2,155
Petroleum, crude.....	brls.	8,590,978	11,160,213	10,133,838	14,415,096
Total.....			78,837,874		85,141,997
OTHER NON-METALLICS					
Asbestos.....	tons	346,805	15,619,865	477,846	21,468,840
Barytes.....	tons	338	4,819	6,890	74,416
Diatomite.....	tons	248	7,957	344	9,935
Feldspar.....	tons	21,455	187,623	26,040	244,284
Fluorspar.....	tons	4,454	59,317	5,534	97,767
Garnet rock.....	tons			16	160
Graphite.....	tons		94,038		132,924
Grindstones.....	tons	341	14,543	188	11,500
Gypsum.....	tons	1,448,788	2,065,933	1,593,406	2,248,428
Iron oxides (ochre).....	tons	9,979	111,874	10,045	142,069
Magnesitic dolomite.....	tons		897,016		831,041
Magnesium sulphate.....	tons			265	7,343
Mica.....	tons	903	237,145	1,744	335,288
Mineral waters.....	Imp. gals.	140,663	20,892	181,064	72,531
Nepheline syenite.....	tons		117,849		227,583
Peat moss.....	tons	(d)	(d)	27,803	644,253
Phosphate.....	tons	358	4,039	2,487	33,376
Quartz.....	tons	1,858,302	1,203,527	2,052,878	1,366,187
Salt (b).....	tons	464,714	2,823,269	560,845	3,196,165
Silica brick.....	M	3,438	182,786	4,111	238,433
Soapstone (c).....	tons		74,905		155,925
Sodium carbonate.....	tons	220	1,760	186	1,488
Sodium sulphate.....	tons	94,260	829,589	115,608	931,554
Strontium minerals.....	tons			27	280
Sulphur**.....	tons	170,630	1,298,018	260,023	1,702,786
Talc.....	tons	15,166	154,734	18,171	204,884
Total.....			26,011,498		34,379,440
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS					
Clay Products— Total.....			6,344,547		7,575,336
OTHER STRUCTURAL MATERIALS					
Cement.....	brls.	7,559,648	11,775,345	8,368,711	13,063,588
Lime (b).....	tons	716,730	5,194,555	860,885	6,357,941
Sand and gravel.....	tons	31,375,415	11,759,245	31,604,806	10,375,723
Stone (b).....	tons	7,447,665	7,398,959	7,940,801	8,000,684
Total.....			36,128,104		37,797,936
Grand Total in Canadian Funds.....			529,825,035		560,241,299

(a) Data not available for publication.

** Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

(b) Includes relatively large quantities used as a chemical material.

* Unless otherwise noted, all total values of mineral production from 1931 to 1941, inclusive, contain estimated exchange equalization on gold produced.

(c) Includes some talc.

(d) Included with manufactures.

1 Ton=2,000 lb.

FOREIGN EXCHANGE, 1941

(Internal Trade Branch)

Chief developments of the year in the foreign exchange market were further decreases in the number of currencies quoted, and further application of controls to remaining currencies. Changes in methods used to maintain fixed rates, rather than the slight changes in quotations, have come to be the significant events in the foreign exchange market.

At the end of 1941, the pound sterling was the only European currency regularly quoted in New York. During the year the course of the war caused several additions to the sterling area. Iceland, the Faroe Islands, and the Free French Empire were included in March and April, Syria and Lebanon in September.

Both the United States and Great Britain maintained their support of the Chinese currency, and attempted to ease the strictures of war upon the economies of the South and Central American republics. In May, Britain included twelve Central American countries, and later added Colombia, in a special sterling account area. Stability of Latin-American exchanges was assisted also by a more favourable balance of trade, derived from an increase of raw material exports to the United States, and a decrease of imports because of exchange controls and priorities on materials and shipping. Repatriation of capital and an influx of American and refugee European capital were also of assistance.

At New York, the pound sterling and Canadian dollar sold in the unofficial market usually at a small discount on the official rate. At times they were at a premium, as improvement of controls reduced the unofficial supply of sterling area currency to a trickle. The pound sterling, the official rates for which are 4.02½–4.03½ at New York, sold unofficially during most of the year at 4.03 or better. On April 17-18 it touched 4.01 and during most of the latter half of April it stayed below 4.03; but from October 27 to the end of the year it was steady at 4.04. The Canadian dollar varied from a low of 82½¢ on January 22 to a high of 89 9/16¢ on September 8. From the end of May to the middle of December, it never fell below 88¢, but just at the end of the year it dropped to 86¢. The unofficial market is now so limited that little importance attaches to these movements.

Since September 16, 1939 Canadian (Montreal) quotations used are the average of the daily buying and selling rate set by the Canadian Foreign Exchange Control Board. The current buying and selling rates for sterling are \$4.43 and \$4.47 and for United States funds \$1.10 and \$1.11.

PRICE MOVEMENTS, CANADA, 1941

(Internal Trade Branch—D.B.S.)

The wartime rate of increase in price levels accelerated during 1941. The general wholesale price index for Canada advanced 11.2 per cent from 84.2 in December, 1940 to 93.6 in December, 1941; and in the same period the cost of living index rose 7.2 per cent, from 108.0 to 115.8. The rise was general, and struck its most rapid pace during the summer months. The increase in area and intensity of the war caused many shortages of basic materials, and advances in shipping and insurance costs. The influence of these factors was clearly apparent in price levels of the United States and the United Kingdom as well as Canada.

As the rise of prices gained momentum in the latter half of 1941, it became clear that controls established over a few key commodities would not check the general advance, and an over-all control of wages, rents, and commodity prices was imposed. On December 1 price movements in Canada were for the first time made subject to a general ceiling, under terms of Order-in-Council P.C. 8527, which, with amendments and additions, constitutes "The Maximum Prices Regulations." Under this Order, maximum prices were the highest prevailing between September 15, 1941, and October 11, 1941, inclusive. Wholesale and retail prices could not legally move about this level after December 1, but below it they could fluctuate freely. There were a few exceptions: for instance the ceiling did not apply to fresh fruits and vegetables; and there was still a minimum price for wheat. Provision was made for maintenance of the ceiling on necessary imported foods as well as on domestic foods and services.

The Dominion Bureau of Statistics index number of living costs on the base 1935-1939=100, rose from 115.4 on January 2nd to 115.7 on February 2nd. A few increases among food prices and certain miscellaneous items, offset to some extent by a fractional decline in clothing, accounted for the advance. Living costs on February 2nd were 14.8 per cent above the August 1, 1939, level.

Table 3.—Canadian Security Price Index Numbers, 1932-1941 (1935-39 = 100)

	Industrial and Utility Common Stock Prices			Mining Stock Prices			Preferred Stock Prices	Dominion Long- Term Bonds	
	Total	Indus- trials	Utili- ties	Total	Gold	Base Metals		Prices	Yields
December 1932.....	47.6	32.4	90.7	44.0	53.3	.....	60.6	87.6	139.8
December 1933.....	68.6	61.3	94.8	73.3	85.3	50.9	72.6	89.6	133.4
December 1934.....	78.6	69.1	94.2	87.1	105.9	51.9	86.1	99.9	103.7
December 1935.....	98.0	98.5	99.0	92.9	98.9	80.5	89.0	97.2	109.1
December 1936.....	117.7	117.0	124.6	117.0	111.5	127.2	113.3	102.4	93.3
December 1937.....	94.5	92.2	98.2	93.7	98.1	85.3	97.7	99.6	100.0
December 1938.....	97.3	98.7	87.3	110.9	103.3	125.3	104.8	102.1	94.0
December 1939.....	92.2	90.9	90.7	99.3	89.2	119.3	110.1	96.9	104.3
December 1940.....	70.3	65.9	76.4	80.2	74.9	90.0	101.7	100.5	97.0
December 1941.....	67.2	63.9	68.7	63.2	52.2	84.8	100.7	102.0	93.6

Table 4.—Average Yearly Prices for Metals, 1937-1941

Metal	Market	Unit	1937	1938	1939	1940	1941
			\$	\$	\$	\$	\$
Antimony (ordinaries).....	New York.....	Pound....	0.15355	0.12349	0.12359	0.14000	0.14000
Arsenic, white (nominal).....	New York.....	Pound....	0.03	0.03000	0.03	0.035	0.040
	New York.....	Pound....	0.13167	0.1000	0.10965	0.11296	0.11797
Copper.....	Montreal.....	Pound....	0.13886	0.1055	0.1077	0.115	0.115
	London.....	Long ton..	59.339	45.411	49.169	(a)	(a)
Gold (in Canadian funds).....		Fine oz....	34.99	35.175	36.141	38.50	38.50
	New York.....	Pound....	0.06009	0.0474	0.0505	0.0518	0.05793
Lead.....	Montreal.....	Pound....	0.05799	0.04176	0.04235	0.05	0.05
	London.....	Long ton..	23.326	15.266	15.437	(a)	(a)
Nickel.....	New York.....	Pound....	0.35	0.35	0.35	0.35	0.35
Platinum (in Canadian funds).....	London.....	Fine oz....	48.45	32.213	35.074	39.086	38.210
Silver.....	New York.....	Fine oz....	0.44881	0.43225	0.39082	0.34773	0.34783
	New York.....	Pound....	0.54337	0.42301	0.50323	0.49827	0.52018
Tin.....	St. Louis.....	Pound....	0.06519	0.0461	0.0511	0.06335	0.07474
Zinc.....	Montreal.....	Pound....	0.05593	0.039	0.0468	0.052	0.0515
	London.....	Long ton..	22.258	13.990	14.956	(a)	(a)

NOTE.—All prices in dollars per unit excepting London copper, lead and zinc prices which are quoted in pounds sterling per long ton.

(a) No quotations.

Table 5.—Metal Prices by Months 1940 and 1941

Month	Copper* (electrolytic) New York (cents per pound) †		Pig Lead* New York (cents per pound)		Silver				Zinc* St. Louis (cents per pound)	
					New York (cents per oz.) -999 fine)		London (pence per oz. -925 fine)			
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
January.....	11.954	11.819	5.471	5.500	34.750	34.750	21.892	23.273	5.644	7.250
February.....	11.148	11.794	5.076	5.602	34.750	34.750	20.935	23.341	5.534	7.250
March.....	11.160	11.814	5.192	5.765	34.750	34.750	20.763	23.446	7.750	7.250
April.....	11.087	11.820	5.071	5.850	34.750	34.750	20.713	23.500	5.750	7.250
May.....	11.079	11.815	5.015	5.850	34.949	34.750	21.878	23.457	5.803	7.250
June.....	11.128	11.810	5.000	5.850	34.825	34.750	22.688	23.400	6.235	7.250
July.....	10.564	11.812	5.000	5.850	34.750	34.750	22.095	23.397	6.250	7.250
August.....	10.708	11.778	4.854	5.850	34.750	34.750	23.261	23.459	6.389	7.250
September.....	11.296	11.775	4.929	5.850	34.750	34.750	23.446	23.500	6.920	7.250
October.....	11.826	11.775	5.308	5.850	34.750	34.750	23.451	23.500	7.250	7.942
November.....	11.800	11.775	5.726	5.850	34.750	34.772	23.238	23.500	7.250	8.250
December.....	11.802	11.775	5.500	5.850	34.750	35.125	23.015	23.500	7.250	8.250
Average.....	11.296	11.797	5.179	5.793	34.773	34.783	22.281	23.439	6.335	7.474

* No London quotations for 1940 or 1941. Montreal quotations remained constant throughout 1940 and 1941 at: copper 11.5 cents; lead 5 cents and zinc 5.2 cents.

Transposed into Canadian funds the average price of copper, based on the London market, was 10.086 cents per pound in 1940 and 1941; the average price of lead based on the same market was 3.362 cents per pound in 1940 and 1941. The average price of zinc in Canadian funds based on the London market in both 1940 and 1941 was 3.411 cents per pound. The average price of silver in Canadian funds, based on the New York market, was 38.249 cents per fine ounce in 1940 and 38.261 cents in 1941.

† F.o.b. refinery. United States prices from E. and M. Journal, New York.

Table 6.—Annual Values of the Mineral Production of Canada since 1886

NOTE.—In presenting a total valuation of the mineral production as is here given, it should be explained that the production of the metals, copper, gold, lead, nickel, silver, zinc, etc., is given as far as possible on the basis of the quantities of metals recovered in smelters, and the total quantities in each case are valued chiefly at the average market price of the refined metal in a recognized market. There is thus included in some cases the values that have accrued in the smelting or refining of metals outside of Canada.

Year	Value of production	Value per capita	Year	Value of production	Value per capita
	\$	\$		\$	\$
1886.....	10,221,255	2.23	1914.....	128,863,075	16.75
1887.....	10,321,331	2.23	1915.....	137,109,171	17.44
1888.....	12,518,894	2.67	1916.....	177,201,534	22.05
1889.....	14,013,113	2.96	1917.....	189,646,821	23.18
1890.....	16,763,353	3.50	1918.....	211,301,897	25.37
1891.....	18,976,616	3.92	1919.....	176,686,390	20.84
1892.....	16,623,415	3.39	1920.....	227,859,665	26.40
1893.....	20,035,082	4.04	1921.....	171,923,342	19.56
1894.....	19,931,158	3.98	1922.....	184,297,242	20.55
1895.....	20,505,917	4.05	1923.....	214,079,331	23.41
1896.....	22,474,256	4.38	1924.....	209,583,406	22.71
1897.....	28,485,023	5.49	1925.....	226,583,333	24.19
1898.....	38,412,431	7.32	1926.....	240,437,123	25.61
1899.....	49,234,005	9.27	1927.....	247,356,695	25.67
1900.....	64,420,877	12.04	1928.....	274,989,487	27.96
1901.....	65,797,911	12.16	1929.....	310,850,246	31.00
1902.....	63,231,836	11.36	1930.....	279,873,578	27.42
1903.....	61,740,513	10.83	1931.....	230,434,726	22.21
1904.....	60,082,771	10.27	1932.....	191,228,225	18.20
1905.....	79,078,999	11.49	1933.....	221,495,253	20.74
1906.....	79,286,697	12.81	1934.....	278,161,590	25.67
1907.....	86,865,202	13.75	1935.....	312,344,457	28.56
1908.....	85,557,101	13.16	1936.....	361,919,372	32.82
1909.....	91,831,441	13.70	1937.....	457,359,092	41.13
1910.....	106,823,623	14.93	1938.....	441,823,237	39.42
1911.....	103,220,994	14.32	1939.....	474,602,059	41.94
1912.....	135,048,296	18.33	1940.....	529,825,035	46.39
1913.....	145,634,812	19.35	1941.....	560,241,290	49.06
			Grand Total.....	9,185,213,594	*804.31

* Based on an estimated population of 11,420,000 in 1941.

NOTE.—For complete data, by minerals, see Annual Mineral Production Reports for 1937 and 1938.

Table 7.—Annual Values of the Mineral Production of Canada, by Classes, since 1929

Year	Metallics	Non-Metallics		Total
		Fuels and other non- metallics	Structural materials and clay products	
	\$	\$	\$	\$
1929.....	154,454,056	97,861,356	58,534,834	310,850,246
1930.....	142,743,764	83,402,349	53,727,465	279,873,578
1931.....	120,920,147	65,346,284	44,158,295	230,434,726
1932.....	112,041,763	56,788,179	22,398,283	191,228,225
1933.....	147,015,593	57,782,973	16,696,687	221,495,253
1934.....	194,110,968	64,763,861	19,286,761	278,161,590
1935.....	221,800,849	67,328,208	23,215,400	312,344,457
1936.....	259,425,194	76,723,437	25,770,741	361,919,372
1937.....	334,165,243	88,324,150	34,869,699	457,359,092
1938.....	323,075,154	84,869,417	33,878,666	441,823,237
1939.....	343,506,123	95,733,177	35,362,759	474,602,059
1940.....	382,503,012	104,849,372	42,472,651	529,825,035
1941.....	395,346,581	119,521,437	45,373,272	560,241,290

Table 8.—Revised Monthly Production of Principal Minerals in Canada, 1941

	Asbestos	Cement	Clay Products	Coal	Copper	Feldspar	Gold	Gypsum	Lead	Lime	Natural Gas	Nickel	Petroleum	Salt	Silver	Zinc
	tons	barrels	\$	tons	pounds	tons	fine ounces	tons	pounds	tons	M cu. ft.	pounds	barrels	tons	fine ounces	pounds
January.....	30,878	282,968	362,568	1,777,863	54,781,632	1,272	435,633	62,345	38,720,908	64,695	5,276,512	24,001,166	803,468	33,394	1,665,459	37,119,749
February.....	31,090	302,614	347,969	1,501,970	50,019,414	2,126	414,035	62,745	33,655,965	62,430	4,870,604	22,371,847	738,064	33,346	1,451,228	34,776,338
March.....	32,060	378,845	418,720	1,546,559	59,185,601	2,138	447,943	67,513	40,639,384	65,249	4,709,312	23,121,865	850,571	34,776	1,927,273	41,645,746
April.....	31,627	569,491	542,636	1,232,802	52,839,253	1,790	440,947	88,483	36,736,700	71,356	3,375,256	23,559,680	823,001	42,229	1,586,716	43,193,490
May.....	38,478	861,745	741,187	1,222,976	55,746,183	2,209	450,607	134,912	40,268,750	72,955	2,943,635	24,450,967	843,992	45,069	2,034,099	44,778,060
June.....	45,484	960,235	767,815	1,179,578	49,710,199	2,331	455,424	152,637	37,360,044	75,637	2,287,804	23,332,192	818,833	49,377	2,201,027	41,990,883
July.....	44,442	945,243	747,014	1,214,319	51,913,511	3,221	458,096	155,238	38,427,070	74,746	2,152,131	23,950,158	877,738	54,351	1,981,006	44,828,312
August.....	48,320	978,973	742,736	1,404,335	52,500,817	3,078	468,704	139,527	31,095,959	73,461	2,186,988	23,031,393	871,768	49,522	1,774,781	43,562,965
September.....	45,610	1,010,179	804,136	1,599,014	52,955,638	2,354	446,493	206,902	40,230,081	74,240	2,690,437	23,474,118	879,677	54,256	1,740,104	44,476,859
October.....	42,607	1,044,171	817,878	1,903,605	55,206,327	2,198	462,629	191,619	42,151,560	79,497	3,309,637	23,826,296	872,378	57,330	1,754,039	45,795,119
November.....	42,494	664,277	739,769	1,828,937	54,530,873	1,977	444,239	163,690	43,884,559	71,988	4,382,085	23,097,955	856,864	56,013	1,797,256	44,473,559
December.....	44,756	369,970	551,908	1,813,963	53,927,265	1,346	420,429	167,745	36,996,025	74,631	5,310,952	24,040,598	897,494	51,182	1,841,420	45,740,556
Calendar Year...	477,846	8,368,711	7,575,336	18,225,921	643,316,713	26,040	5,345,179	1,593,406	460,167,005	860,885	43,495,353	282,258,235	10,133,838	560,845	21,754,408	512,381,636

Table 9.—Total (Cumulative) Recorded Production in Canada of Specified Metals and Minerals to December 31, 1941

		Quantity	Value
			\$
Gold.....	(a) fine ounces	80,882,236	2,244,890,539
Silver.....	(b) fine ounces	829,253,149	472,130,763
Copper.....	(c) pounds	7,996,458,967	944,335,804
Nickel.....	(d) pounds	3,334,193,845	925,913,983
Lead.....	(b) pounds	7,306,138,058	320,838,852
Zinc.....	(f) .....	.....	212,625,623
Cobalt.....	(e) pounds	34,121,271	33,412,960
Platinum metals.....	(g) fine ounces	2,303,747	.....
Coal.....	(h) tons	632,597,970	1,905,509,002
Asbestos.....	(i) tons	7,753,019	292,106,214

NOTE.—The total value of production by the entire Canadian mining industry from 1886 to the end of 1941 totalled \$9,185,213,594.

(a) Since 1858; (b) since 1887; (c) since 1886; (d) since 1889; (e) since 1904; (f) since 1893; (g) since 1920. Production data prior to 1920 were not included owing to some doubt existing as to origin of certain metals recovered in United States plants (h) since 1785; (i) since 1880.

Table 10.—Values of the Mineral Production of Canada, by Provinces, since 1932

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba
	\$	\$	\$	\$	\$
1932.....	16,201,279	2,223,505	25,638,466	85,910,030	9,058,365
1933.....	16,966,183	2,107,682	28,141,482	110,205,021	9,026,951
1934.....	23,310,729	2,156,151	31,269,945	145,565,871	9,776,934
1935.....	23,183,128	2,821,027	39,124,696	158,934,269	12,052,417
1936.....	26,672,278	2,587,791	49,736,919	184,532,892	11,315,527
1937.....	30,314,188	2,763,643	65,160,215	230,042,517	15,751,645
1938.....	26,253,645	3,802,565	68,965,594	219,801,994	17,173,002
1939.....	30,746,200	3,949,433	77,335,998	232,519,948	17,137,930
1940.....	33,318,587	3,435,916	86,313,491	261,483,349	17,828,522
1941.....	32,569,867	3,690,375	99,651,044	267,435,727	16,689,867

Year	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories (*)
	\$	\$	\$	\$	\$
1932.....	1,681,728	21,174,061	27,326,173	1,993,195	21,423
1933.....	2,477,425	19,702,953	30,794,504	2,041,223	279,729
1934.....	2,977,061	20,228,851	41,206,965	1,628,379	199,604
1935.....	3,816,943	22,289,681	48,692,050	1,302,308	541,638
1936.....	6,970,397	23,305,726	54,407,036	2,220,372	775,834
1937.....	10,271,463	25,597,117	73,555,798	3,784,528	994,518
1938.....	7,782,847	28,966,272	64,549,130	3,959,570	1,614,076
1939.....	8,794,090	30,691,617	65,216,745	4,961,321	3,248,777
1940.....	11,505,858	35,092,337	74,134,485	4,118,333	2,594,157
1941.....	15,020,555	41,364,365	76,841,180	3,117,992	3,860,298

* Complete annual values of production of radium products included in 1941 annual report for first time.

NOTE.—In the following provincial tables the value of gold includes the exchange equalization. For further information on the price of gold see Chapter II.

Table 11.—Mineral Production of Nova Scotia,* 1939-1941

Product	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Antimony.....pound	1,200	148				
Copper.....pound	1,269,179	128,086				
Gold.....fine oz.	29,943	1,082,170	22,219	855,432	19,170	738,045
Lead.....pound	2,545,122	80,655				
Manganese ore.....tons	4	88	152	4,315		
Manganese metal.....pound					7,500	2,250
Silver.....fine oz.	173,877	70,399	725	277	673	257
Tungsten concentrates.....pound			8,586	5,226		
Zinc.....pound	9,152,856	280,901	4,755,502	162,210		
NON-METALLICS—						
Barytes.....tons			25	162	6,561	72,468
Coal.....tons	7,051,176	25,611,271	7,848,921	28,766,195	7,387,762	28,446,204
Diatomite.....tons	279	9,661	241	7,786	239	7,310
Fluorspar.....tons			17	365	300	3,900
Grindstones.....tons	152	5,616	53	2,378		
Gypsum.....tons	1,298,618	1,340,830	1,278,204	1,302,347	1,395,172	1,517,297
Quartz.....tons	10,547	18,927	8,755	15,670	11,477	24,100
Salt.....tons	47,885	213,029	42,495	220,328	54,007	307,637
Silica brick.....M	1,890	75,212	2,809	120,125	2,828	119,511
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....tons		339,952		490,543		529,435
Lime—						
Quicklime.....tons	14,469	125,969	21,685	181,133	20,789	198,057
Hydrated lime.....tons	312	3,542	329	2,961	152	1,520
Sand and gravel.....tons	2,139,427	1,225,827	1,440,140	867,490	749,441	332,531
Stone.....tons	49,835	393,917	181,451	313,644	113,602	269,345
Total.....		30,746,200		33,318,587		32,569,867

* Pig iron produced in Nova Scotia from Newfoundland ores totalled 374,953 long tons in 1941; 259,136 long tons in 1939 and 394,412 long tons in 1940.

Table 12.—Mineral Production of New Brunswick, 1939-1941

Product	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Manganese ore.....tons	392	3,600				
NON-METALLICS—						
Coal.....tons	468,421	1,566,359	547,064	1,963,012	523,344	2,021,394
Grindstones.....tons	152	9,662	255	12,000	188	11,500
Gypsum.....tons	29,765	134,286	52,218	192,980	56,172	150,530
Natural gas.....M cu. ft.	606,382	292,403	616,041	300,543	653,542	317,437
Petroleum.....brls.	22,799	32,082	22,167	31,220	31,359	44,102
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....tons		129,985		171,745		193,643
Lime—						
Quicklime.....tons	11,558	97,084	13,234	111,476	14,539	122,797
Hydrated lime.....tons	7,117	54,814	8,002	63,931	7,213	57,336
Sand and gravel.....tons	3,373,303	1,363,051	944,033	278,710	962,483	423,772
Stone.....tons	75,409	266,107	166,153	310,299	138,148	347,864
Total.....		3,949,433		3,435,916		3,690,375

Table 13.—Mineral Production of Quebec, * 1939-1941

Product	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃)..... tons			**		2,056,000	89,024
Chromite..... lb.			335	5,780	2,372	42,679
Copper..... lb.	117,238,897	11,831,749	134,166,955	13,532,079	143,783,978	14,502,052
Gold..... fine oz.	953,377	34,455,998	1,019,175	39,238,238	1,089,339	41,339,552
Lead..... lb.						
Molybdenite concentrates..... lb.	2,240	600	22,251	10,280	196,600	88,470
Selenium..... lb.	23,841	42,175	43,510	83,104	203,162	388,039
Silver..... fine oz.	1,167,444	472,675	1,340,450	512,709	1,657,082	634,016
Tellurium..... lb.	2,940	4,769				
Titanium ore, sold for export..... tons	3,694	21,267	5,535	24,510	12,651	49,110
Tungsten concentrates..... lb.					989	627
Zinc..... lb.	28,758,759	882,606	27,696,721	944,735	46,389,581	1,582,349
NON-METALLICS—						
Asbestos..... tons	364,454	15,858,492	346,805	15,619,865	477,846	21,468,840
Barite..... tons					101	808
Feldspar..... tons	5,399	60,923	8,548	89,004	14,218	137,160
Iron oxides (ochre)..... tons	5,465	82,501	9,603	107,926	8,770	139,185
Magnesian dolomite.....		474,418		897,016		831,041
Mica..... tons	434	122,243	436	202,583	802	284,563
Natural mineral waters..... Imp. gal.	104,629	17,503	109,025	18,466	144,441	58,062
Peat moss..... tons	(a)	(a)	(a)	(a)	7,265	173,639
Phosphate..... tons	157	1,712	358	4,039	2,487	33,376
Quartz..... tons	104,827	369,172	109,090	321,891	147,318	388,948
Soapstone†.....		41,471		74,905		155,925
Sulphur..... tons	61,476	275,951	61,728	212,012	146,826	575,422
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement..... brls.	3,027,759	4,035,294	3,854,339	5,432,105	4,048,749	5,798,188
Clay products.....		1,274,776		1,546,246		1,944,358
Lime—						
Quicklime..... tons	134,331	844,055	197,531	1,307,869	245,814	1,791,604
Hydrated lime..... tons	26,781	139,017	35,888	172,597	60,701	271,140
Sand and gravel..... tons	10,050,985	2,703,032	12,177,624	3,127,931	11,681,390	2,673,300
Stone..... tons	2,528,355	3,323,599	2,755,830	2,827,601	3,775,330	3,609,567
Total.....		77,335,998		86,313,491		99,651,044

(a) Included under manufacturing.

* There is also in this province an important production of aluminium from imported ores.

† Includes some talc.

** Arsenic ore was shipped from a gold mine for experimental purposes.

Table 14.—Mineral Production of Ontario, * 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Arsenic (As ₂ O ₃)..... lb.	1,741,917	52,257	2,093,275	62,798	1,482,000	64,171
Bismuth..... lb.			17,789	24,620	7,499	10,379
Chromite..... tons						
Cobalt..... lb.	732,561	1,213,454	794,359	1,235,220	263,257	255,904
Copper..... lb.	328,429,665	32,637,305	347,931,013	34,742,229	333,829,767	33,192,644
Gold..... fine oz.	3,086,076	111,533,873	3,261,688	125,574,988	3,194,308	122,980,858
Iron ore..... short tons	123,598	341,594	414,603	1,211,305	516,037	1,426,057
Lead..... lb.	39,130	1,240	345,455	11,614	1,622,823	54,559
Molybdenite (concentrates)..... lb.	482	216				
Nickel..... lb.	226,105,865	50,920,305	245,557,871	59,822,591	282,258,235	68,656,795
Palladium, rhodium, etc..... fine oz.	135,402	4,199,622	91,522	3,520,746	97,432	3,396,304
Platinum..... fine oz.	148,877	5,221,712	108,464	4,239,424	124,257	4,747,860
Selenium..... lb.	126,930	224,539	136,350	260,429	142,498	272,171
Silver..... fine oz.	4,689,422	1,898,653	5,563,101	2,127,831	4,977,476	1,904,432
Tellurium..... lb.			3,491	5,607	11,453	18,394
Tungsten concentrates..... lb.			1,064	690	3,830	2,432
Zinc..... lb.					1,100,949	37,553

Table 14.—Mineral Production of Ontario,* 1939-1941—Concluded

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
NON-METALLICS—						
Asbestos.....	tons 18	720				
Barytes.....	tons	3,639	305	4,577		
Diatomite.....	tons 5	280				
Feldspar.....	tons 7,061	51,056	12,907	98,619	11,822	107,124
Fluorspar.....	tons 240	4,995	4,437	58,952	5,234	93,867
Garnet (schist).....	tons				16	160
Graphite.....	tons	61,684		94,038		132,924
Gypsum.....	tons 59,440	260,792	75,271	313,512	90,599	276,459
Mica.....	tons 564	22,978	458	31,962	794	47,047
Natural mineral waters.....	Imp. gal. 19,140	1,602	31,638	2,426	36,623	14,469
Natural gas.....	M cu. ft. 11,966,581	7,261,928	13,053,403	7,745,834	11,828,703	7,140,130
Nepheline syenite.....	\$	140,148		117,849		227,583
Peat (fuel).....	tons 445	2,445	30	75	355	2,155
Peat (moss).....	tons (b)	(b)	(b)	(b)	4,315	42,708
Petroleum.....	brls. 206,379	401,430	187,644	397,078	160,238	337,760
Quartz (a).....	tons 1,333,342	665,148	1,581,367	810,285	1,745,244	899,687
Salt.....	tons 370,843	2,200,189	412,401	2,371,780	477,170	2,512,166
Silica brick.....	M 603	49,595	629	62,661	1,283	118,922
Strontium minerals.....	tons				27	280
Sulphur†.....	tons 16,126	161,260	18,688	186,880	10,057	100,570
Talc.....	tons 13,144	128,595	15,166	154,734	18,171	204,884
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....	brls. 1,709,263	2,437,777	2,355,352	3,518,247	2,748,854	4,019,656
Clay Products.....		2,346,638		2,508,540		3,087,616
Lime—						
Quicklime.....	tons 268,622	1,870,035	334,471	2,340,606	373,927	2,649,304
Hydrated lime.....	tons 33,637	366,917	38,163	412,181	57,198	597,344
Sand and gravel.....	tons 9,350,875	3,537,216	9,678,745	4,025,026	11,569,382	4,524,463
Stone.....	tons 2,437,594	2,298,111	3,840,274	3,387,395	3,526,242	3,277,936
Total.....		232,519,948		261,483,349		267,435,727

† Sulphur content of pyrites shipped and estimated sulphur salvaged from smelter gases.

(a) Includes low grade silica sand for fluxing purposes.

* The total production of blast-furnace pig iron in Ontario, chiefly from foreign ores and scrap, in 1941 was 988,176 long tons; in 1939 it was 496,595 long tons and in 1940 a total of 774,427 long tons.

(b) Included with manufactures.

Table 15.—Mineral Production of Manitoba, 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....	lb. 73,830	52,029	57,742	67,154	61,085	71,714
Copper.....	lb. 70,458,890	7,110,711	75,267,937	7,591,524	67,018,563	6,759,492
Gold.....	fine oz. 180,875	6,537,063	152,295	5,863,357	150,553	5,796,290
Selenium.....	lb. ↑	↑	↑	↑	32,179	61,462
Silver.....	fine oz. 1,028,485	416,413	1,033,512	395,308	966,105	369,641
Tellurium.....	lb. ↑	↑	↑	↑	↑	↑
Zinc.....	lb. 40,302,747	1,236,891	35,103,373	1,197,376	34,879,239	1,189,731
NON-METALLICS—						
Coal.....	tons 1,138	3,110	1,697	4,037	1,246	3,411
Feldspar.....	tons 40	330				
Gypsum.....	tons 15,961	98,578	23,108	137,051	27,601	162,822
Lithium minerals.....	\$					
Natural gas.....	cu. ft. 600	180	600	180	(b)	(b)
Peat moss.....	tons (a)	(a)	(a)	(a)	1,457	32,342
Salt.....	tons 2,453	35,888	3,076	45,731	13,051	115,367
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....	brls. 343,717	773,363	572,408	1,287,918	576,648	1,274,392
Clay products.....		78,892		102,906		84,817
Lime—						
Quicklime.....	tons 15,625	119,696	17,261	135,326	21,444	174,624
Hydrated lime.....	tons 4,407	76,494	4,906	82,221	5,656	98,868
Sand and gravel.....	tons 1,863,593	514,404	1,851,645	839,993	1,503,901	429,996
Stone.....	tons 36,143	83,948	48,706	78,440	38,347	64,898
Total.....		17,137,930		17,828,522		16,689,967

† No commercial recovery reported by smelter; sometimes recovered by copper refiner but not paid for.

(a) Included with manufactures.

(b) No official reports received; estimated in previous years.

Table 16.—Mineral Production of Saskatchewan, 1939-1940

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Cadmium.....lb.	66,608	46,939	71,594	83,264	108,832	127,769
Copper.....lb.	18,133,149	1,829,997	20,484,954	2,066,112	32,324,512	3,260,250
Gold.....fine oz.	77,120	2,787,194	102,925	3,962,613	138,015	5,313,578
Selenium.....lb.	†	†	†	†	29,091	55,564
Silver.....fine oz.	1,141,600	462,211	1,691,540	646,997	2,047,164	783,266
Tellurium.....lb.	†	†	†	†	†	†
Zinc.....lb.	37,278,001	1,144,062	44,452,595	1,516,278	62,142,288	2,119,673
Non-METALLICS—						
Coal.....tons	959,595	1,255,142	1,097,517	1,408,540	1,322,763	1,713,478
Grinding pebbles.....tons			33	165		
Quartz (a).....tons	134,192	46,967	159,090	55,681	148,208	51,873
Salt.....tons						
Sodium sulphate.....tons	71,455	627,965	94,250	829,539	115,600	931,522
Natural gas.....M cu. ft.	96,423	36,640	100,773	30,232	106,168	31,850
Petroleum crude.....brls			331	256		
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Clay products.....tons		148,774		164,828		224,897
Sand and gravel.....tons	1,913,995	408,199	1,472,885	741,353	1,220,801	406,835
Total		8,794,090		11,505,858		15,020,555

(a) Low grade silica sand for fluxing purposes.

† No commercial recovery reported. See Footnote preceding table.

Table 17.—Mineral Production of Alberta, 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
		\$		\$		\$
METALLICS—						
Gold.....fine oz.	359	12,974	215	8,277	215	8,277
Silver.....fine oz.	32	13	20	8	21	8
Non-METALLICS—						
Bituminous sands.....tons	(a)	(a)	(a)	(a)	(a)	(a)
Coal.....tons	5,519,208	14,415,281	6,203,839	16,377,959	6,969,962	19,382,471
Natural gas.....M cu. ft.	22,513,660	4,915,821	27,459,808	4,923,469	30,905,440	5,175,364
Peat moss.....tons	(b)	(b)	(b)	(b)	421	5,055
Petroleum.....brls	7,576,932	9,362,363	8,362,203	10,694,394	9,918,577	13,985,906
Salt.....tons	3,319	37,526	6,742	185,430	16,617	260,995
Sodium sulphate.....tons	30	186	10	50	8	32
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	377,846	744,357	414,183	832,508	492,515	985,030
Clay products.....		461,079		838,856		952,144
Lime—						
Quicklime.....tons	12,113	104,772	16,421	145,210	17,276	144,556
Hydrated lime.....tons	386	3,860	451	4,510	674	6,740
Sand and gravel.....tons	817,168	619,105	1,722,465	1,069,667	956,484	433,504
Stone.....tons	3,048	14,280	3,981	11,999	7,942	24,303
Total		30,691,617		35,092,337		41,364,353

(a) Included with petroleum refining; no crude sands sold.

(b) Included with manufactures.

Table 18.—Mineral Production of British Columbia, 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Antimony.....lb.	1,224,385	151,321	2,594,492	396,468	3,185,077	445,911
Bismuth.....lb.	409,449	466,362	40,740	56,384	12	17
Cadmium.....lb.	799,253	563,241	778,791	905,734	1,081,374	1,269,533
Copper.....lb.	73,253,408	7,392,734	77,742,582	7,841,117	66,327,166	6,689,758
Gold.....fine oz.	626,970	22,659,323	617,011	23,754,924	608,203	23,415,816
Lead.....lb.	378,440,666	11,992,784	466,849,112	15,695,467	456,840,454	15,358,976
Magnesium.....lb.					110,905	2,944
Mercury.....lb.	436	1,226	153,830	369,317	536,304	1,335,697
Nickel.....lb.						
Platinum.....fine oz.	25	877	24	938	60	2,293
Silver.....fine oz.	10,648,031	4,311,175	11,885,556	4,546,106	11,233,788	4,298,160
Tin.....lb.					64,744	33,667
Tungsten concentrates.....lb.	8,825	4,917	2,352	1,387	34,495	21,453
Zinc.....lb.	279,041,497	8,563,784	312,020,671	10,643,025	367,869,579	12,548,031
NON-METALLICS—						
Barytes.....tons			8	80	228	1,140
Coal.....tons	1,537,905	5,464,061	1,867,846	6,157,250	2,020,844	6,492,672
Diatomite.....tons	17	447	7	171	105	2,625
Grindstones, pulpstones.....tons						
Gypsum.....tons	18,150	100,641	19,987	120,043	23,862	141,320
Iron oxides (ochre).....tons	550	5,917	376	3,948	275	2,884
Magnesium sulphate.....tons	550	9,900			265	7,343
Mica (schist).....tons	(a)	(a)	8	2,600	148	3,678
Peat moss.....tons	(b)	(b)	(b)	(b)	14,345	390,509
Quartz.....tons					631	1,579
Sodium carbonate.....tons	300	2,400	220	1,760	186	1,488
Sulphur*.....tons	133,676	1,230,814	90,214	899,126	103,140	1,026,794
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—						
Cement.....brls.	272,679	520,420	363,366	704,567	501,945	986,322
Clay products.....brls.		371,140		520,383		558,426
Time—						
Quicklime.....tons	18,035	165,036	23,200	200,138	30,075	206,769
Hydrated lime.....tons	4,816	32,223	5,188	34,396	5,427	37,282
Sand and gravel.....tons	2,284,995	870,268	2,087,675	809,075	2,960,924	1,161,322
Stone.....tons	313,138	335,734	451,270	469,581	341,190	406,771
Total		65,216,745		74,134,485		76,841,180

* Includes sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid and other products made from waste smelter gases.

(a) Data not available for publication.

(b) Included with manufactures.

† Powder.

Table 19.—Mineral Production of Yukon, 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Gold.....fine oz.	87,745	3,171,192	80,458	3,097,633	70,959	2,731,922
Lead.....lb.	7,544,632	239,089	4,655,689	156,524	1,703,728	57,280
Silver.....fine oz.	3,830,864	1,551,040	2,259,343	864,176	856,772	327,810
Tungsten concentrates.....lb.					1,560	980
NON-METALLIC—						
Coal.....tons						
Total		4,961,321		4,118,333		3,117,992

Table 20.—Mineral Production of Northwest Territories, 1939-1941

Products	1939		1940		1941	
	Quantity	Value	Quantity	Value	Quantity	Value
METALLICS—		\$		\$		\$
Copper.....lb.	42,382	4,277			32,727	3,301
Gold.....fine oz.	51,914	1,876,224	55,159	2,123,621	74,417	2,865,054
Radium products.....(a)		1,121,553	(a)	410,176	(a)	925,136
Natural gas.....M cu. ft.	1,500	335	1,500	335	1,500	335
Silver.....fine oz.	483,874	195,911	59,505	22,760	15,327	5,864
Petroleum, crude.....brls.	20,191	50,477	18,633	37,265	23,664	47,328
Tungsten concentrates.....lb.					41,972	13,220
Total		3,248,777		2,594,157		3,860,298

(a) Data not available for publication, recovered in refinery located at Port Hope, Ontario.

Note.—For complete data relating to Canadian Mineral Production, by Provinces, see Annual Mineral Production Report for 1938.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1937-1941

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
Metal Mining Industries							
ALLUVIAL GOLD MINES							
1937.....	106	109	11,919,937	1,069	1,689,911	176,560	3,066,636
1938.....	111	113	12,846,973	1,071	2,056,936	288,370	3,753,052
1939.....	98	104	9,844,524	830	1,439,765	318,613	4,204,974
1940.....	125	126	9,933,594	840	1,680,779	298,680	3,820,169
1941.....	108	110	10,755,706	797	1,954,278	332,361	3,800,142
AURIFEROUS QUARTZ MINES							
1937.....	631	659	269,145,649	29,140	48,219,318	24,714,827	97,961,278
1938.....	535	550	251,203,802	29,647	50,462,092	28,674,805	114,472,106
1939.....	455	474	248,692,569	30,622	53,206,225	30,380,927	129,633,245
1940.....	428	438	250,919,160	31,405	55,205,096	32,076,741	146,713,744
1941.....	338	357	243,138,864	32,551	62,150,810	33,124,349	145,978,833
COPPER-GOLD-SILVER MINES							
1937.....	35	38	73,338,258	5,164	8,240,614	15,832,950	24,902,851
1938.....	37	39	65,416,729	5,577	8,921,465	20,544,691	28,795,492
1939.....	28	30	58,867,620	6,083	9,920,591	24,978,891	26,182,577
1940.....	25	26	60,446,948	6,115	10,777,827	25,370,357	**27,804,419
1941.....	21	22	81,521,902	5,866	10,695,023	34,608,742	30,220,331
SILVER-COBALT MINES							
1937.....	23	25	2,655,060	300	394,386	312,624	540,762
1938.....	34	30	2,606,217	297	386,851	446,070	288,293
1939.....	36	43	2,461,556	323	412,728	237,096	653,032
1940(e).....	48	44	337,080	123	158,024	57,347	809,263
1941.....	24	14	439,877	182	229,984	126,372	662,443
SILVER-LEAD-ZINC MINES*							
1937.....	128	130	29,637,739	2,220	3,914,643	5,788,385	22,740,582
1938.....	107	108	30,386,714	1,640	3,027,915	5,068,253	18,483,945
1939.....	82	83	23,664,620	1,646	2,803,057	4,699,242	13,555,609
1940.....	82	83	19,969,198	1,585	3,052,532	4,380,568	16,439,630
1941.....	63	64	17,717,334	1,666	3,452,199	3,624,765	20,653,212
NICKEL-COPPER MINES							
1937.....	8	11	33,979,540	5,462	10,193,491	5,185,229	25,812,659
1938.....	8	11	35,363,940	5,342	9,916,179	5,174,237	25,491,028
1939.....	4	7	35,307,319	5,759	10,960,710	6,117,331	32,259,124
1940.....	3	6	36,765,154	6,372	12,256,863	6,783,621	34,240,489
1941.....	3	6	41,730,329	6,490	13,680,994	7,214,448	41,525,277
MISCELLANEOUS METAL MINES							
1937.....	15	15	1,320,012	121	155,191	33,385	52,655
1938.....	19	19	1,380,035	129	145,551	16,906	-7,997
1939.....	31	31	3,074,999	331	455,278	175,573	349,404
1940.....	36	36	2,720,642	445	628,025	720,173	1,309,105
1941.....	46	47	2,931,695	725	1,141,244	1,355,563	2,073,323
NON-FERROUS METAL SMELTING AND REFINING							
1937.....	10	13	162,696,595	11,570	17,990,947	(b)216,470,386	†101,807,865
1938.....	10	13	184,337,126	12,788	19,549,963	(b)200,204,359	†87,091,374
1939.....	9	13	192,186,465	12,449	19,372,119	(b)182,544,662	†80,057,833
1940.....	9	13	234,826,742	13,466	21,766,197	(b)207,301,259	†98,059,268
1941.....	9	13	309,963,342	16,014	27,482,689	(b)259,585,976	†119,736,294
Total Metal Mining Industries							
1937.....	956	1,000	584,692,790	55,046	90,798,501	268,514,346	276,885,288
1938.....	861	883	583,631,536	56,491	94,466,952	260,417,691	278,367,293
1939.....	743	785	574,099,672	58,043	98,570,473	249,452,335	286,895,798
1940.....	756	772	615,918,818	60,351	105,525,343	276,988,746	**329,196,007
1941.....	612	633	708,199,049	64,291	120,787,221	339,972,576	364,649,855

*Contains data relating to silver-pitchblende ores in the Northwest Territories. †Value added by smelting.

(b) Includes fuel and electricity used for metallurgical purposes and cost of ores, etc. treated which were \$191,303,251 in 1937, \$173,070,377 in 1938, \$154,879,498 in 1939, \$174,274,655 in 1940, and \$213,542,005 in 1941.

(c) See footnote at end of this table. (d) See end of table.

(e) The large decrease in capital employed in the Silver-Cobalt industries in 1940 resulted largely from the leasing of the O'Brien mine and the cessation of mining operations by M. J. O'Brien Ltd. Delinquent returns, received after completion of these totals show 83 employees receiving \$88,105 in salaries and wages in the Silver-Cobalt Industry also capital was increased by \$154,109.

**Revised data.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1937-1941—Continued

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
Total Non-Metal Mining Industries, including Fuels							
*FUELS							
COAL							
1937.....	480	503	118,273,848	27,202	31,641,679	8,717,711	37,261,013
1938.....	462	498	111,495,137	27,074	28,699,781	7,926,328	34,207,513
1939.....	467	510	109,072,484	26,472	30,720,991	8,203,815	38,062,870
1940.....	491	527	103,634,890	26,434	34,043,162	8,996,231	43,552,679
1941.....	417	469	106,498,356	26,330	38,149,602	9,680,614	45,780,866
NATURAL GAS							
1937.....	218	3,268	75,611,107	2,028	2,488,125	98,880	8,938,446
1938.....	218	3,325	79,143,830	1,966	2,506,121	82,887	9,748,677
1939.....	222	3,352	78,409,338	1,990	2,536,220	98,397	10,634,146
1940.....	236	3,438	80,487,766	2,189	2,748,740	94,354	11,108,749
1941.....	231	3,424	81,280,541	2,161	2,841,795	108,204	11,114,899
PETROLEUM							
1937.....	280	2,328	42,147,521	1,620	2,340,359	1,109,966	4,892,672
1938.....	310	2,400	51,685,038	1,894	2,656,112	1,141,762	8,986,071
1939.....	348	2,389	52,102,077	1,780	2,567,983	1,432,055	9,310,922
1940.....	300	2,860	53,216,853	1,741	2,835,410	1,467,995	10,018,083
1941.....	272	2,312	58,206,984	1,844	3,254,817	803,798	14,207,526
TOTAL FUELS							
1937.....	978	6,099	236,032,476	30,850	36,470,163	9,926,557	51,092,131
1938.....	990	6,223	242,324,005	30,934	33,869,014	9,150,977	52,942,261
1939.....	1,037	6,251	239,533,899	30,242	35,325,194	9,734,267	58,007,938
1940.....	1,027	6,325	237,339,609	30,364	39,637,312	10,558,580	64,679,511
1941.....	920	6,205	245,985,881	30,335	44,246,214	10,592,616	71,103,281
OTHER NON-METAL MINING INDUSTRIES							
ASBESTOS							
1937.....	10	11	21,249,676	3,842	4,232,507	4,076,235	10,429,556
1938.....	8	9	22,008,771	3,711	4,024,363	3,187,725	9,702,470
1939.....	8	9	22,489,233	3,784	4,347,064	3,463,513	12,395,699
1940.....	8	9	19,799,280	3,886	4,728,702	3,720,968	11,903,688
1941.....	9	10	21,325,558	3,760	4,996,101	4,246,246	17,229,399
FELDSPAR, QUARTZ, AND NEPHELINE SYENITE							
1937.....	39	39	1,352,992	445	384,698	186,470	1,242,244
1938.....	32	32	1,605,136	375	342,245	168,509	1,065,138
1939.....	43	43	1,591,015	338	330,170	178,721	1,173,950
1940.....	44	46	2,174,258	400	377,254	214,517	1,294,482
1941.....	38	38	2,314,582	506	610,489	250,983	1,587,071

* Production of peat since 1929 included in the miscellaneous non-metallics.

(c) See footnote at end of this table.

(d) See footnote at end of table.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1937-1941—Continued

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c)
			\$		\$	\$	\$
<i>OTHER NON-METAL MINING INDUSTRIES—Continued</i>							
GYPSUM							
1937.....	8	13	6,902,222	602	595,396	263,077	1,277,406
1938.....	9	15	7,325,412	623	528,027	239,306	1,262,959
1939.....	10	17	6,806,907	714	692,158	299,319	1,635,808
1940.....	9	16	4,648,662	694	717,666	418,339	1,647,594
1941.....	8	15	5,175,821	648	745,008	452,008	1,796,420
IRON OXIDES (OCHRE)							
1937.....	6	6	213,248	50	35,368	13,878	69,762
1938.....	6	6	200,057	37	31,557	8,124	63,645
1939.....	7	7	215,445	38	26,916	8,194	80,224
1940.....	7	7	195,263	46	38,842	18,033	93,841
1941.....	4	4	189,877	44	42,152	21,394	120,675
MICA							
1937.....	34	34	150,569	199	97,547	17,546	116,185
1938.....	40	40	159,758	156	74,424	19,247	1,603,833
1939.....	61	61	230,337	224	112,653	19,014	128,307
1940.....	65	65	259,168	218	134,705	27,829	209,316
1941.....	81	81	1,180,097	246	181,800	39,529	295,759
PEAT (e)							
1940.....	(f) 22	(f) 22	(f) 825,154	(f) 667	(f) 486,116	(f) 17,472	(f) 628,936
1941.....							
SALT							
1937.....	9	9	4,001,568	543	653,136	259,064	1,540,401
1938.....	9	9	4,270,799	562	786,720	309,080	1,603,833
1939.....	9	9	4,447,204	547	741,736	1784,778	2,173,204
1940.....	9	9	4,993,914	586	836,506	1860,768	2,461,482
1941.....	9	9	5,559,307	668	1,018,652	1,175,966	2,676,533
TALC AND SOAPSTONE							
1937.....	7	7	625,497	83	72,020	25,394	138,420
1938.....	6	6	212,491	75	59,426	23,907	120,941
1939.....	6	6	239,835	65	60,512	22,332	147,734
1940.....	8	8	319,398	94	80,879	37,130	192,509
1941.....	8	8	695,581	148	128,820	55,206	305,603
MISCELLANEOUS							
1937†.....	53	53	3,050,376	530	658,723	550,872	1,136,445
1938.....	50	50	2,787,671	394	475,567	409,229	779,093
1939.....	46	47	3,128,035	465	539,143	394,357	964,565
1940.....	46	46	2,491,527	547	703,501	608,028	1,508,728
1941.....	61	63	2,648,830	683	878,700	797,564	1,645,184

(c) See footnote at end of this table.

(d) See footnote at end of this table.

(e) Includes data on peat fuel, peat moss and peat humus.

(f) Peat moss included with manufactures; peat fuel under miscellaneous non-metals.

† Includes natural abrasives data for first time.

‡ Value of containers is included from 1939.

Table 21—Principal Statistics of the Mineral Industry in Canada, by Industries,
1937-1941—Continued

1 Year	2 Number of active firms	3 Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	4 Capital employed (excluding ore reserves or other unmined material) \$	5 Number of employees	6 Salaries and wages \$	7 Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	8 Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
TOTAL OTHER NON-METAL MINING INDUSTRIES							
1937.....	166	172	37,546,148	6,294	6,729,395	5,392,536	15,950,419
1938.....	160	167	38,570,095	5,933	6,322,332	4,365,127	14,659,821
1939.....	190	199	39,148,011	6,175	6,850,352	5,170,228	18,699,491
1940.....	196	206	34,881,470	6,471	7,618,055	5,905,612	19,311,640
1941.....	240	250	39,914,807	7,370	9,087,838	7,056,368	26,285,580

Total Non-Metal Mining Industries, including Fuels

1937.....	1,144	6,271	273,578,624	37,144	43,199,558	15,319,093	67,042,550
1938.....	1,150	6,390	280,894,100	36,867	40,184,346	13,516,104	67,602,082
1939.....	1,227	6,450	278,731,910	36,417	42,675,546	14,904,495	76,707,429
1940.....	1,223	6,531	272,220,979	36,835	47,245,367	16,464,192	83,991,151
1941.....	1,160	6,455	285,900,688	37,705	53,334,652	17,648,984	97,388,861

Clay Products and Other Structural Materials

CLAY PRODUCTS

Brick, Tile and Sewer Pipe

1937.....	131	137	20,087,448	2,159	2,002,075	1,121,754	3,163,758
1938.....	140	147	17,756,732	2,125	2,009,836	1,039,148	3,284,486
1939.....	133	141	17,614,307	2,055	2,072,351	1,093,160	3,852,837
1940.....	132	136	16,569,424	2,343	2,488,390	1,402,681	4,581,541
1941.....	127	132	16,734,645	2,557	2,981,278	1,748,511	5,323,433

STONEWARE AND POTTERY

1937.....	6	6	339,784	128	92,717	14,569	216,778
1938.....	5	5	311,810	117	100,397	14,701	197,749
1939.....	8	8	326,435	110	89,337	14,338	190,901
1940.....	7	7	577,019	214	156,861	19,547	340,778
1941.....	10	10	642,908	324	246,507	20,062	483,330

TOTAL CLAY PRODUCTS*

1937.....	137	143	20,427,232	2,287	2,094,792	1,136,223	3,380,536
1938.....	145	152	18,068,542	2,242	2,110,233	1,053,849	3,482,235
1939.....	141	149	17,940,742	2,165	2,161,638	1,107,498	4,043,738
1940.....	139	143	17,146,443	2,557	2,675,251	1,422,228	4,922,319
1941.....	137	142	17,577,553	2,831	3,227,735	1,768,573	6,806,763

OTHER STRUCTURAL MATERIALS†

CEMENT

1937.....	4	9	54,150,672	1,083	1,373,444	2,445,333	6,650,534
1938.....	3	8	52,299,046	1,034	1,306,331	2,293,584	5,947,766
1939.....	3	8	51,251,358	1,001	1,297,542	2,238,039	6,273,172
1940.....	3	8	50,370,276	1,052	1,515,766	4,291,221	8,715,422
1941.....	3	8	51,108,294	1,235	1,860,931	5,044,208	9,279,164

(c) See footnote at end of this table.

(d) See footnote at end of this table.

* Includes kaolin and other clays.

† A considerable proportion of the values shown for lime and stone sales represents shipments for chemical purposes—see Chapter 9.

Table 21.—Principal Statistics of the Mineral Industry in Canada, by Industries, 1939-1941—Concluded

1	2	3	4	5	6	7	8
Year	Number of active firms	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material) \$	Number of employees	Salaries and wages \$	Cost of process supplies, purchased electricity and fuel also freight and smelter charges (d) \$	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (c) \$
OTHER STRUCTURAL MATERIALS—Concluded							
LIME							
1937.....	52	57	4,931,831	872	781,274	1,038,958	2,785,959
1938.....	48	53	4,881,214	867	795,068	939,989	2,602,663
1939.....	54	59	4,802,983	937	849,468	1,052,012	2,951,502
1940.....	50	55	5,107,739	962	1,003,671	1,601,546	3,593,009
1941.....	45	50	4,633,946	1,105	1,321,571	2,196,529	4,161,412
SAND AND GRAVEL							
1937.....	1,560	7,373	6,706,288	6,084	3,468,471	295,348	10,197,348
1938.....	1,339	6,094	3,286,340	6,959	4,482,916	254,595	11,747,959
1939.....	1,403	6,215	2,735,690	6,120	3,981,913	274,509	10,966,593
1940.....	1,458	5,596	3,456,502	4,243	3,744,585	291,008	11,468,237
1941.....	1,399	5,407	4,287,789	3,252	2,995,526	474,647	9,901,076
STONE							
1937.....	418	555	12,857,537	2,898	2,576,344	1,085,548	5,853,812
1938.....	429	550	11,187,274	2,815	2,298,154	890,350	4,665,676
1939.....	452	573	12,215,030	3,076	2,816,578	1,081,884	5,993,812
1940.....	482	560	12,127,271	2,886	2,779,703	1,204,375	6,194,584
1941.....	457	539	11,162,036	2,758	2,896,100	1,283,183	6,717,501
TOTAL OTHER STRUCTURAL MATERIALS							
1937.....	2,034	7,994	78,646,328	10,937	8,199,533	4,865,187	25,437,653
1938.....	1,819	6,705	71,653,874	11,675	8,882,469	4,378,518	24,964,064
1939.....	1,912	6,855	71,003,061	11,134	8,945,501	4,646,444	25,585,079
1940.....	1,993	6,219	71,061,788	9,143	9,043,725	7,388,150	29,971,852
1941.....	1,904	6,004	71,192,065	8,350	9,074,128	8,998,567	30,059,153
Total Clay Products and Other Structural Materials							
1937.....	2,171	8,137	99,073,560	13,224	10,294,325	6,001,510	28,868,189
1938.....	1,964	6,857	89,722,416	13,917	10,992,702	5,432,367	28,446,299
1939.....	2,053	7,004	88,943,803	13,299	11,107,189	5,753,942	29,628,817
1940.....	2,132	6,362	88,208,231	11,700	11,718,976	8,810,378	34,893,571
1941.....	2,041	6,146	88,569,618	11,231	12,301,913	10,767,140	35,865,916
GRAND TOTAL OF ALL INDUSTRIES							
1937.....	4,271	15,408	957,344,974	105,414	144,292,384	289,834,949	372,796,027
1938.....	3,975	14,130	954,248,052	107,275	145,644,000	279,365,162	374,415,674
1939.....	4,023	14,239	941,775,385	107,759	152,353,208	270,110,772	393,232,044
1940.....	4,111	13,665	976,348,028	108,886	164,489,686	302,263,316	448,080,729
1941.....	3,813	13,234	1,082,669,355	113,227	186,423,186	365,388,700	497,904,632

(c) The value of fuel, purchased electricity and process supplies used was deducted from the gross value of shipments for the first time in 1935 this was done in order to attain a more accurate approximation of a net value. Also the cost of ores, etc., treated in non-ferrous metallurgical plants is deducted in determining the figure "value added"; these costs were as follows: 1937, \$191,303,251; 1938, \$173,070,377; 1939, \$154,879,498; 1940, \$174,274,655; 1941, \$213,542,005. (d) The cost of freight and treatment charges were deducted by the shipper of metal bearing ores for all years prior to 1937; since 1937 the costs of freight and treatment charges were reported separately and deducted at the Bureau of Statistics.

Note.—The net value as given in column 8 represents the **gross value** as given by the operator less the cost of items indicated in column 7.

* Revised data.

Table 22.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1937-1941

1 Year	2 Number of operating mines, oil and gas wells, quarries gravel pits, etc.	3 Capital employed (excluding ore reserves or other unmined material) \$	4 Number of employees	5 Salaries and wages \$	6 Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d) \$	7 Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*) \$
(c) NOVA SCOTIA						
1937.....	1,210	59,114,458	15,629	18,373,958	6,076,253	22,597,547
1938.....	810	52,594,162	15,591	15,959,095	5,258,556	20,224,347
1939.....	914	52,580,559	15,202	17,371,518	5,450,671	23,504,419
1940.....	666	48,086,422	14,934	19,235,662	6,041,154	26,189,233
1941.....	622	48,356,346	15,246	21,388,809	6,684,110	24,535,707
NEW BRUNSWICK						
1937.....	423	4,676,203	3,012	1,509,063	293,867	2,442,101
1938.....	409	4,310,273	3,042	2,074,273	273,978	3,506,250
1939.....	426	4,466,757	3,263	2,311,835	329,538	3,600,454
1940.....	423	4,522,307	2,240	1,939,160	376,192	3,024,317
1941.....	428	4,429,485	2,262	2,097,842	421,785	3,231,658
QUEBEC						
1937.....	5,120	181,868,872	19,121	22,708,131	67,723,503	60,872,828
1938.....	4,161	179,013,810	20,829	24,485,254	79,226,191	69,593,807
1939.....	4,137	179,371,057	20,872	25,689,382	81,840,188	81,600,118
1940.....	3,857	213,363,729	21,726	29,025,418	93,034,012	⊕ 100,134,979
1941.....	3,780	298,678,687	23,149	34,008,021	127,618,884	127,649,905
ONTARIO						
1937.....	6,343	389,129,937	36,238	58,891,339	145,830,800	190,447,576
1938.....	6,342	389,031,046	35,791	58,926,900	136,143,954	181,897,886
1939.....	6,380	397,025,573	37,233	63,220,042	119,307,190	188,867,969
1940.....	6,406	405,063,185	38,774	66,395,845	135,879,424	209,277,055
1941.....	6,196	408,374,770	40,496	74,902,555	154,713,109	219,459,986
MANITOBA						
1937.....	275	55,815,784	3,159	4,301,366	14,293,086	13,415,841
1938.....	276	44,564,907	2,840	4,393,270	14,478,826	15,144,672
1939.....	260	36,516,216	3,027	4,541,992	16,217,955	12,401,404
1940.....	136	39,640,423	3,145	5,107,054	16,016,832	14,065,270
1941.....	185	41,780,442	3,101	5,312,075	18,966,154	11,898,109
SASKATCHEWAN						
1937.....	248	22,037,133	2,307	2,372,443	7,376,254	8,226,326
1938.....	269	18,695,606	2,287	2,470,530	5,345,294	7,029,842
1939.....	258	18,838,439	2,026	2,347,264	6,749,197	6,391,404
1940.....	252	17,008,171	1,961	2,573,878	7,033,060	8,652,006
1941.....	249	22,851,100	1,977	3,105,529	12,689,122	9,336,756

Plants in the provinces do not add to Canada total, owing to the fact that a plant located in the Manitoba-Saskatchewan boundary is counted but once.

* See footnote, preceding table.

(b) Includes fuel and electricity used for metallurgical purposes.

(c) Statistics for Prince Edward Island included with Nova Scotia in 1936.

(d) See footnote, previous table.

⊕ Revised data.

Table 22.—Principal Statistics of the Mineral Industry in Canada, by Provinces, 1937-1941—Concluded

1	2	3	4	5	6	7
Year	Number of operating mines, oil and gas wells, quarries, gravel pits, etc.	Capital employed (excluding ore reserves or other unmined material)	Number of employees	Salaries and wages	Cost of process supplies, purchased electricity and fuel, also freight and smelter charges (b) (d)	Net value of bullion, ore, concentrates, residues and other minerals shipped from the mines, smelters, brick and cement plants and quarries (*)
		\$		\$	\$	\$
ALBERTA						
1937.....	637	110,055,642	10,843	12,924,934	2,819,959	20,988,638
1938.....	678	120,140,472	10,612	12,811,975	2,967,269	24,931,056
1939.....	709	121,311,648	10,548	13,097,818	3,508,845	26,049,861
1940.....	729	120,234,760	10,628	14,535,789	3,832,268	29,583,293
1941.....	742	129,681,543	11,141	17,065,351	3,612,114	36,167,469
BRITISH COLUMBIA						
1937.....	1,135	121,739,009	14,282	21,487,277	44,123,775	51,176,437
1938.....	1,158	129,667,163	15,179	21,975,143	33,686,771	49,519,855
1939.....	1,130	119,437,585	14,587	21,698,690	34,754,310	45,419,651
1940.....	1,169	115,249,764	14,420	23,227,719	38,730,717	52,513,427
1941.....	1,008	114,213,762	14,801	25,797,418	42,582,946	60,323,299
NORTHWEST TERRITORIES						
1937.....	8	2,114,300	132	221,181	113,221	(a) — (e)
1938.....	17	4,186,077	310	584,619	407,710	(a) — (e)
1939.....	15	2,110,344	273	468,996	354,228	1,592,779
1940.....	16	3,037,930	441	880,414	623,965	1,539,206
1941.....	12	4,267,299	553	1,174,903	565,197	2,355,624
YUKON						
1937.....	10	10,793,636	691	1,502,692	1,184,231	2,685,664
1938.....	11	12,044,536	794	1,962,941	1,577,613	2,667,051
1939.....	10	10,117,207	728	1,605,671	1,598,650	3,803,985
1940.....	11	10,141,337	617	1,518,747	695,692	3,091,943
1941.....	12	10,035,921	501	1,570,683	535,279	2,946,119
Canada						
1937.....	15,408	957,344,974	105,414	144,292,334	289,834,949	372,796,027
1938.....	14,130	954,248,052	107,275	145,644,000	279,366,162	374,415,674
1939.....	14,239	941,775,385	107,759	152,353,208	270,110,772	393,232,044
1940.....	13,665	976,348,028	108,886	164,489,686	302,263,316	⊕ 448,050,729
1941.....	13,234	1,082,669,355	113,227	186,423,186	368,388,700	497,904,632

Plants in the provinces do not add to Canada total, owing to the fact that a plant located on the Manitoba-Saskatchewan boundary is counted but once.

* See footnote, preceding table.

(a) Value of radium and uranium not included.

(b) Includes fuel and electricity used for metallurgical purposes.

(d) See footnote, previous table.

(e) Northwest Territories showed a loss of \$56,931 in 1937 and \$99,092 in 1938 owing to the fact that radium and uranium refinery products are not included. These amounts should be subtracted from the total net value by provinces to give the total net value for Canada. The value of refinery products is credited to the non-ferrous smelting and refining industry of Ontario.

⊕ Revised data.

Table 23.—Summary, by Nine Main Branches, of the Net Value of Commodity Production in Canada for 1938-1940*

	1938	1939	1940	Percentage of total net value, 1940
	\$	\$	\$	%
Agriculture.....	742,020,000	826,390,000	885,115,000	23.15
Forestry.....	244,564,571	271,723,416	370,121,275	9.68
Fisheries.....	35,593,009	84,373,681	38,106,690	1.00
Trapping.....	6,572,824	7,919,412	11,207,930	0.29
Mining (Total).....	374,415,674	393,232,044	446,080,729	11.67
Auriferous quartz.....	114,472,106	129,633,245	146,713,744	3.84
Other mining.....	259,943,568	263,598,799	299,366,985	7.83
Electric power.....	142,320,725	149,863,892	163,780,757	4.28
Construction.....	176,661,077	183,706,338	206,893,992	5.41
Custom and repair.....	99,086,100	96,652,386	110,745,000	2.90
Manufactures, n.e.s.....	1,153,439,474	1,277,265,130	1,591,625,600	41.62
Grand Total.....	2,974,673,454	3,241,131,299	3,823,676,973	100.00
Manufactures, Total (a).....	1,428,286,778	1,531,051,901	1,914,412,381	50.07

* Business Statistics Branch, Dominion Bureau of Statistics (1940 Survey of Production Report).

(a) The difference between "manufactures, total" and "manufactures, n.e.s." is the amount of the duplication between primary and secondary industries. The sum of "manufactures, n.e.s." and the eight other main branches is regarded as the grand total.

Table 24.—Proportion Contributed by Mining to Total Net Value of Production in each Province, 1938-1940

Province	1938		1939		1940		
	Mining net	Percentage of net value provincial production	Mining net	Percentage of net value provincial production	Mining net	Percentage of net value provincial production	
						All mines	Auriferous quartz mines only
	\$	%	\$	%	\$	%	%
Prince Edward Island.....							
Nova Scotia.....	20,224,347	20.40	23,504,419	22.36	26,189,233	19.83	0.47
New Brunswick.....	3,506,250	5.01	3,600,454	4.74	3,024,317	3.36	
Quebec.....	69,593,807	9.11	81,600,118	9.75	98,134,979	9.71	2.31
Ontario.....	181,897,886	14.07	188,867,969	13.69	209,277,055	12.74	6.20
Manitoba.....	15,144,672	10.44	12,401,404	8.29	14,065,270	7.96	1.32
Saskatchewan.....	7,029,842	5.13	6,391,404	2.82	8,652,006	3.93	0.23
Alberta.....	24,931,056	11.96	26,049,861	11.82	29,593,293	12.63	
British Columbia, Yukon and Northwest Territories.....	52,087,814	21.14	50,816,415	19.74	57,144,576	18.87	5.96
Canada.....	374,415,674	12.59	393,232,044	12.05	446,080,729	11.67	3.84

TREND IN EMPLOYMENT

(Employment Statistics Branch—D.B.S.)

MINING

Mining in general showed eight monthly increases in 1941, resulting in the greatest volume of employment in the twenty-one years of the record; the annual index was 176.7, compared with 168.4 in the preceding year, previously the highest figure.

In *coal mining*, the index averaged 94.8, or a few points above the 1940 figure of 91.3. The labour force of the 105 cooperating operators included 26,056 workers in 1941, as against a mean of 25,064 employees in 105 mines in the preceding year.

Employment generally in the extraction of *metallic ores* reached a new high level in 1941, despite the existence of an industrial dispute in the latter part of the year which seriously affected employment and earnings. The annual index stood at 366.5, as compared with the average of 350.9 in the preceding twelve months. The index varied between 340.5 at January 1, and 378.9 at November 1. The staffs of the 200 reporting firms averaged 46,801 during the year under review, compared with 43,983 in 210 mines during 1940. War-time demand for both precious and base metals resulted in the maintenance of a high level of activity among producing mines; however, in a number of cases it was reported that prospecting and development operations were curtailed.

Non-metallic minerals, other than coal, provided more employment in 1941 than in any earlier year since 1920. The index averaged 150·5, or 5·5 per cent above the 1940 figure of 142·6. An average payroll of 10,119 persons was employed during 1941 by the 110 cooperating firms, while those reporting in the preceding year had a mean of 9,571. Quarries and other divisions coming under this heading recorded a rather better situation.

The extension of National Selective Service "To effect the orderly and efficient employment of the men and women of Canada for the varied purposes of war" was announced by the Prime Minister, Rt. Hon. W. L. Mackenzie King, in the House of Commons on March 24, 1942. Salient facts in the mobilization of the country's human resources include: Man power reserves for war services and industry will be increased by:

- (a) Accelerating the program of curtailing civilian production and the attendant shifting of labour into some form of war service.
- (b) Extending training, re-training and upgrading of working forces.
- (c) Re-conditioning the physically unfit.
- (d) Bringing women into industry.

By a scheme of training for personnel management, supervisors are to be made available to war industries. The age limit for compulsory service has been raised from 24 to 30 years for men unmarried as of July 15, 1940, selection to be by lot over the entire age range. There will be stabilization of employment in agriculture. There will be prohibition of entry into a schedule of restricted occupations and industries by physically fit men of military age. It was provided that, on and after March 23, 1942, no male person shall accept employment and no employers shall engage any male person in any of these restricted occupations, unless such person presents to the prospective employer a birth certificate or other incontrovertible evidence that his age is less than seventeen or more than forty-five years; or a certificate of honourable discharge from the armed forces; or evidence of rejection on grounds of physical unfitness for active service in the armed forces during the present year; or a permit from a national selective officer authorizing him to accept such employment. A schedule of the restricted occupations can be obtained from the Department of Labour, Ottawa.

Table 25.—Strikes and Lockouts in Canada, by Industries, 1940 and 1941
(Department of Labour)

	1940					1941				
	Number of disputes	Workers involved		Time lost		Number of disputes	Workers involved		Time lost	
		No.	Per cent of total	Man working days	Per cent of total		No.	Per cent of total	Man working days	Per cent of total
Agriculture.....	1	50	0·1	200	0·1	1	300	0·3	4,000	0·9
Logging.....	5	1,855	3·1	12,070	4·5	48	41,476	47·6	191,689	44·2
Fishing and trapping.....	70	31,652	52·2	76,303	28·6	(45)	(38,136)	(43·8)	(109,069)	(25·1)
Mining, etc. (1).....	(65)	(31,223)	(51·5)	(68,734)	(25·8)	127	36,730	42·2	205,845	47·4
Coal mining.....	56	16,118	26·6	148,631	55·8	27	5,889	6·0	13,997	3·2
Manufacturing.....	18	1,953	3·2	4,476	1·7	13	1,566	1·8	4,224	1·0
Construction.....	7	6,816	11·3	15,087	5·7	4	193	0·2	760	0·2
Transportation and public utilities	4	1,404	2·3	6,668	2·5	11	937	1·1	13,399	3·1
Trade.....	7	771	1·2	2,883	1·1					
Service.....										
Total.....	163	60,619	100·0	266,315	100·0	231	87,091	100·0	433,914	100·0

(1) Non-ferrous smelting is included with mining.

Labour disputes in the mining industry during 1941 accounted for 48 out of the total of 231 during the year and involved nearly one-half of the workers in all disputes but caused only 44 per cent of the time loss for the year. All of the mining disputes were in coal mines except one strike of gold miners at Kirkland Lake, Ontario for union recognition which involved 2,800 miners from November 18 and lasted until February 11, 1942 when it was called off. The time loss due to this strike during 1941 only was 78,000 days, 40 per cent of the total for all mining. Only one of the coal strikes caused great time loss, that of nearly 10,000 miners in Cape Breton Island, Nova Scotia, on April 14 for a week, against the wage scale in a new agreement. This was followed by a "slow down" to work by many of the miners until September when the cost of living bonus was increased. The loss in production from this is not reflected in the figures as to time loss.

Table 26.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Provinces, 1941

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage earners	Total†	Salaries	Wages	Total
	Male	Female			\$	\$	\$
Nova Scotia.....	560	75	14,611	15,246	1,242,954	20,145,855	21,388,809
New Brunswick.....	82	24	2,156	2,262	197,882	1,899,960	2,097,842
Quebec.....	1,838	215	21,096	23,149	4,220,622	29,787,399	34,008,021
Ontario.....	3,375	452	36,669	40,496	9,699,662	65,202,893	74,902,555
Manitoba.....	305	25	2,771	3,101	825,807	4,486,268	5,312,075
Saskatchewan.....	196	22	1,759	1,977	530,257	2,575,272	3,105,529
Alberta.....	1,121	143	9,877	11,141	2,633,630	14,431,721	17,065,351
British Columbia.....	1,380	222	13,199	14,801	3,684,596	22,112,822	25,797,418
Yukon.....	31	5	465	501	162,242	1,408,441	1,570,683
Northwest Territories.....	72	2	479	553	169,031	1,005,872	1,174,903
Canada.....	8,960	1,185	103,082	113,227	23,366,683	163,056,503	186,423,186

* The average number of wage-earners was obtained by adding the monthly figures for individual companies and dividing by 12 irrespective of the number of months worked, the average number of wage-earners in the industry, as in the previous years, is the sum of these individual averages.

† The data are not inclusive of all individuals or syndicates engaged exclusively in prospecting or general exploration.

Table 27.—Employees, Salaries and Wages in the Mineral Industry in Canada, by Industries, 1941

Industry	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
METAL MINING							
Alluvial Gold Mines.....	71	11	715	797	228,300	1,725,978	1,954,278
Auriferous Quartz Mines.....	2,549	182	29,820	32,551	7,415,094	54,735,716	62,150,810
Copper-Gold-Silver Mines.....	469	61	5,336	5,866	1,434,711	9,260,312	10,695,023
Silver-Cobalt Mines.....	22	3	157	182	60,914	169,070	229,984
Silver-Lead-Zinc Mines†.....	217	22	1,427	1,666	526,818	2,925,381	3,452,199
Nickel-Copper Mines.....	326	4	6,160	6,490	974,387	12,706,607	13,680,994
Miscellaneous Metal Mines.....	75	3	647	725	149,149	992,095	1,141,244
Non-ferrous Smelting and Refining.....	1,478	272	14,264	16,014	4,117,398	23,365,291	27,482,689
NON-METAL MINING, INCLUDING FUELS							
Coal.....	1,228	122	24,980	26,330	2,844,053	35,305,549	38,149,602
Natural gas.....	852	207	1,102	2,161	1,659,559	1,182,236	2,841,795
Petroleum.....	356	60	1,428	1,844	867,638	2,387,179	3,254,817
Other Non-Metallic Mining							
Asbestos.....	269	45	3,446	3,760	679,394	4,316,707	4,996,101
Feldspar and Quartz (a).....	28	4	474	506	52,137	558,352	610,489
Gypsum.....	41	7	600	648	90,935	654,073	745,008
Iron Oxides.....	6	1	37	44	8,571	33,581	42,152
Mica.....	15	1	230	246	23,193	158,607	181,800
Peat (b).....	32	5	630	667	65,988	420,128	486,116
Salt.....	106	42	520	668	361,661	656,991	1,018,652
Talc and Soapstone.....	7	1	140	148	21,564	107,256	128,820
Miscellaneous.....	67	15	601	683	181,225	697,475	878,700
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS							
Cement.....	79	8	1,148	1,235	190,771	1,670,160	1,860,931
Clay Products.....	241	41	2,599	2,881	602,549	2,625,236	3,227,785
Lime.....	76	16	1,013	1,105	150,695	1,170,876	1,321,571
Sand and Gravel.....	97	12	3,143	3,252	214,840	2,780,686	2,995,526
Stone.....	253	40	2,465	2,758	445,139	2,450,961	2,896,100
Total.....	8,960	1,185	103,082	113,227	23,366,683	163,056,503	186,423,186

* See footnote, preceding table. † Includes pitchblende-silver mines. (a) Includes nepheline-syenite mines. (b) Includes fuel, moss and humus.

Table 28.—The Number of Wage Earners in the Canadian Mining Industry, 1941, who Worked the Number of Hours Specified, during One Week in Month of Highest Employment

(Does not include overtime)

	30 hours or less	31-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-54 hours	55 hours	56-64 hours	65 hours and over	Grand total	Total wages paid in that week*
												\$
By provinces—												
Nova Scotia.....	121	246	114	33	14,695	30	234	21	612	164	16,270	508,525
New Brunswick.....	56	161	86	28	2,651	43	266	25	231	34	3,581	64,261
Quebec.....	736	821	363	298	14,334	1,184	2,639	843	4,561	808	26,587	745,262
Ontario.....	621	1,047	210	1,883	22,566	1,245	3,216	377	7,381	1,559	40,105	1,387,358
Manitoba.....	81	50	116	26	2,387	95	106	8	806	257	3,932	108,799
Saskatchewan.....	38	99	53	12	1,198	41	140	56	610	110	2,357	68,951
Alberta.....	240	967	327	171	9,462	130	825	40	775	233	13,170	445,495
British Columbia.....	142	248	271	237	11,213	270	459	18	1,975	160	14,993	481,792
Yukon.....									751	121	872	44,731
Northwest Territories.....	16	27		7	70	3	21	15	235	83	477	18,732
Canada.....	2,051	3,666	1,540	2,695	78,576	3,041	7,906	1,403	17,937	3,529	122,344	3,873,906
By Industries—												
METAL MINING												
Alluvial Gold Mines.....	8	17		1	150	4	10	1	957	185	1,333	56,501
Auriferous Quartz Mines.....	542	967	60	387	17,357	583	2,829	565	8,608	1,088	32,986	1,174,432
Copper-Gold-Silver Mines.....	82	59	8	15	4,055	81	488	8	770	114	5,680	192,432
Silver-Cobalt Mines.....		34		1	112		7		33	6	193	4,760
†Silver-Lead-Zinc Mines.....	14	7		3	1,405	1	8	1	278	17	1,734	62,755
Nickel-Copper Mines.....	49	75	1	461	5,678		92	4	61	19	6,440	250,114
Miscellaneous Metal Mines.....	19	51	8	18	165	73	143	7	426	59	969	29,490
Non-Ferrous Smelting and Re- fining.....	125	83	114	977	12,359	475	678	21	634	40	15,506	496,285
NON-METAL MINING, INCLUDING FUELS												
Coal.....	263	817	189	168	25,028	105	459	71	1,021	200	28,321	945,043
Natural gas.....	71	170	224	107	334	27	328	23	168	102	1,554	38,620
Petroleum.....	54	432	9	24	709	39	132	2	363	49	1,813	55,245
Other Non-Metal Mining												
Asbestos.....	7	11	9	5	1,915	552	1,043	12	332	51	3,937	106,889
Feldspar and Quartz.....	31	35	6	9	155	25	53	12	246	75	647	15,337
Gypsum.....	79	46	59	30	81	29	69	18	222	186	819	19,030
Iron Oxides.....					33	8			13		54	977
Mica.....	4	12		3	80	119	24	7	11		268	3,890
Peat (a).....	183	184	110	79	55	24	78	36	274	66	1,089	17,558
Salt.....	23	48	33	27	134	19	35	25	184	60	588	16,132
Talc and Soapstone.....	9	4	7	5		12	2	2	128	22	191	3,234
Miscellaneous.....	44	53	12	16	126	20	92	8	234	209	814	19,004
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS												
Cement.....	5	54	69	28	457	62	104	13	411	78	1,281	34,775
Clay Products.....	63	137	268	152	484	450	601	180	889	150	3,374	72,702
Lime.....	7	23	65	6	304	6	200	84	308	145	1,148	28,451
Sand and Gravel.....	121	73	53	17	6,700	24	101	48	317	248	7,702	139,955
Stone.....	248	274	236	156	700	303	330	255	1,049	352	3,903	90,295
Total.....	2,051	3,666	1,540	2,695	78,576	3,041	7,906	1,403	17,937	3,529	122,344	3,873,906

†Contains data on mining of silver-pitchblende ores in the Northwest Territories.

*Includes the actual money wages paid, the value of room and board, where provided, deductions from employees for social services, such as sickness, accident, insurance, pensions, etc., as well as any other allowance forming part of the employees' wages.

(a) In all forms.

Table 29.—Employees and Salaries and Wages Paid in Canadian Mining Industry, 1930-1941

Year	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	15,484	19,284,197	1,391	1,132,306	15,397	15,190,714	24,706	34,433,915	3,021	4,372,044	1,371	1,040,790
1931.....	14,871	15,302,444	1,197	1,048,860	11,141	12,666,586	20,277	30,470,475	2,059	3,096,332	1,092	896,131
1932.....	13,706	11,302,801	1,480	1,123,080	7,694	8,198,379	16,376	24,412,126	1,730	2,106,017	924	748,782
1933.....	13,915	9,852,765	1,629	1,402,114	8,629	8,621,984	17,306	25,600,168	1,379	1,847,251	1,265	1,111,001
1934.....	13,500	13,594,114	1,722	1,276,770	10,362	10,492,169	22,033	32,619,846	1,948	2,796,454	1,461	1,257,282
1935.....	14,550	14,301,510	2,390	1,865,407	11,811	12,794,600	25,264	38,152,140	2,346	3,403,649	1,457	1,343,041
1936.....	15,368	15,980,687	1,744	1,248,431	14,225	15,774,362	31,105	46,899,805	2,932	3,752,367	1,828	1,937,825
1937.....	15,629	18,373,958	3,012	1,509,063	19,121	22,708,131	36,238	58,891,339	3,159	4,301,366	2,307	2,372,443
1938.....	15,591	15,959,095	3,042	2,074,273	20,829	24,485,254	35,791	58,926,900	2,840	4,393,270	2,287	2,470,530
1939.....	15,202	17,371,518	3,263	2,311,835	20,872	25,689,382	37,233	63,220,042	3,027	4,541,992	2,026	2,347,264
1940.....	14,934	19,285,662	2,240	1,939,160	21,726	29,025,418	38,774	66,395,845	3,145	5,107,054	1,961	2,573,878
1941.....	15,246	21,388,809	2,262	2,097,842	23,149	34,008,021	40,496	74,902,555	3,101	5,312,075	1,977	3,105,529

Year	Alberta		British Columbia		Yukon		Northwest Territories		Canada	
	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
1930.....	12,675	16,272,916	14,836	21,412,925	319	835,525			89,200	113,975,332
1931.....	10,579	11,357,722	11,297	16,345,887	296	784,862			72,809	91,969,299
1932.....	9,692	10,476,449	9,565	12,612,151	286	761,585	17	30,679	61,470	71,772,649
1933.....	9,057	9,463,382	9,845	11,455,946	233	545,692	76	131,502	63,334	70,031,805
1934.....	9,843	9,792,297	12,270	15,482,102	286	660,814	80	154,338	73,505	88,126,186
1935.....	9,706	10,862,198	12,352	16,479,606	333	809,067	47	69,341	80,256	100,080,559
1936.....	10,376	11,850,463	12,827	17,908,553	566	1,372,917	28	40,812	90,999	116,766,222
1937.....	10,843	12,924,934	14,282	21,487,277	691	1,502,692	132	221,181	105,414	144,292,384
1938.....	10,612	12,811,975	15,179	21,975,143	794	1,962,941	310	584,619	107,275	145,644,000
1939.....	10,548	13,097,818	14,587	21,698,690	728	1,605,671	273	468,996	107,759	152,353,208
1940.....	10,628	14,535,789	14,420	23,227,719	617	1,518,747	441	880,414	108,886	164,489,686
1941.....	11,141	17,065,351	14,801	25,797,418	501	1,570,683	553	1,174,903	113,227	186,423,186

Table 30.—Wage-earners, Surface, Underground and Mill, 1941

Province	Metal Mines			Fuels			Other†		
	Surface (a)	Under- ground	Mill	Surface	Under- ground	Mill	Surface	Under- ground	Mill
Nova Scotia.....	64	143	32	2,150	10,779	.....	1,320	49	74
New Brunswick.....	20	8	.....	471	942	.....	652	31	32
Quebec.....	7,020	5,042	701	.....	.....	.....	5,360	711	2,262
Ontario.....	12,176	18,058	1,785	943	.....	.....	3,154	116	437
Manitoba.....	1,061	841	165	1	3	.....	578	16	106
Saskatchewan.....	494	276	93	261	359	.....	214	.....	62
Alberta.....	.....	.....	.....	3,416	5,611	.....	751	.....	99
British Columbia.....	4,802	3,784	1,024	653	1,914	.....	886	.....	136
Yukon.....	73	37	355	.....	.....	.....	.....	.....	.....
Northwest Territories..	230	199	43	7	.....	.....	.....	.....	.....
Total 1941.....	25,940	28,388	4,198	7,902	19,608	.....	12,915	923	3,208
Total 1940.....	23,525	27,575	3,833	8,040	19,859	.....	12,979	775	2,958
Total 1939.....	23,018	26,530	3,750	8,037	19,861	.....	11,406	857	5,766
Total 1938.....	23,326	24,754	3,713	8,277	20,260	.....	15,808	678	1,894

† Includes asbestos, salt, gypsum, stone quarries, brick plants, etc., etc.
(a) Including non-ferrous smelters and refineries.

Table 31.—Fuel and Electricity Used for All Purposes

Industry	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
METAL MINING								
Alluvial Gold.....	Quantity	4	22		1	1	84,517	3,402
	\$	30	2,245		14	109	47,343	3,307
Auriferous Quartz.....	Quantity	28,648	24,911	1,336	651	187	573,175	28,812
	\$	287,346	253,698	15,719	13,001	936	196,145	7,006
Copper-Gold-Silver.....	Quantity	13,275	152		82,445	101	75,578	7,141
	\$	123,399	3,763		176,155	2,110	24,542	1,799
Silver-Cobalt.....	Quantity		449	179	36		17,720	20
	\$		7,538	2,669	601		5,636	4
Silver-Lead-Zinc.....	Quantity	42,114	78			8	39,458	1,369
	\$	161,589	996			58	15,092	490
Nickel-Copper.....	Quantity	1,711	10,042	730	47	34	52,507	2,674
	\$	12,296	70,976	5,621	777	457	14,484	555
Miscellaneous Metals.....	Quantity	100	47			24,266	61,031	454
	\$	1,294	40			98,343	19,650	93
Non-Ferrous Smelting and Refining.	Quantity	447,000	498,359	20		363,127	268,962	9,063
	\$	2,946,142	3,550,229	391		3,749,269	76,393	1,890
<i>Total.....</i>	<i>Quantity</i>	<i>533,452</i>	<i>533,888</i>	<i>2,439</i>	<i>734</i>	<i>82,633</i>	<i>1,172,948</i>	<i>52,935</i>
	\$	<i>3,532,096</i>	<i>3,884,022</i>	<i>30,408</i>	<i>14,379</i>	<i>177,105</i>	<i>3,852,949</i>	<i>15,144</i>
NON-METAL MINING								
<i>Fuels</i>								
Coal.....	Quantity	559,521			49,728		146,585	3,803
	\$	1,702,277			54,659		40,607	1,099
Natural Gas.....	Quantity	356	262				94,025	1,140
	\$	2,802	2,115				21,074	271
Petroleum.....	Quantity	924	4		1	1	56,487	3,388
	\$	2,772	48		10	19	16,388	500
<i>Total.....</i>	<i>Quantity</i>	<i>560,801</i>	<i>266</i>		<i>49,739</i>	<i>1</i>	<i>297,097</i>	<i>8,331</i>
	\$	<i>1,707,851</i>	<i>2,163</i>		<i>64,669</i>	<i>19</i>	<i>78,069</i>	<i>1,870</i>
<i>Other Non-Metal Mining</i>								
Asbestos.....	Quantity	35,311	2,444	14,403	3,978		132,424	6,892
	\$	289,723	22,868	124,694	34,482		38,554	1,295
Feldspar, nepheline	Quantity	1,129	4,290	321			54,050	1,950
	\$	9,037	29,194	3,035			14,147	465
Gypsum.....	Quantity	11,295	1,613			1,695	138,957	823
	\$	73,428	12,552			6,042	32,428	161
Iron Oxides.....	Quantity				11		740	50
	\$				138		239	11
Mica.....	Quantity	261				55	36,740	160
	\$	2,677					9,121	52
Peat.....	Quantity	30	17	2			31,125	509
	\$	105	114	45			8,351	96
Salt.....	Quantity	14,773	49,331				90,225	33
	\$	91,298	268,492		14,091		21,429	9
Talc and Soapstone.....	Quantity	5			48,744		14,448	90
	\$	45					3,631	17
Miscellaneous.....	Quantity	18,430	8,693	37	12,962		156,898	2,900
	\$	104,908	62,335	557	35,019		45,017	561
<i>Total.....</i>	<i>Quantity</i>	<i>81,234</i>	<i>66,388</i>	<i>14,764</i>	<i>3,989</i>	<i>28,748</i>	<i>655,607</i>	<i>13,407</i>
	\$	<i>571,221</i>	<i>395,556</i>	<i>123,531</i>	<i>34,620</i>	<i>89,305</i>	<i>172,917</i>	<i>2,667</i>
STRUCTURAL MATERIALS AND CLAY PRODUCTS								
Cement.....	Quantity	125,740	203,905				157,133	5,831
	\$	772,829	1,331,448				38,277	1,102
Clay Products.....	Quantity	30,155	112,301	1,128	250	4,436	179,497	2,053
	\$	204,362	866,947	10,616	1,915	12,300	48,982	492
Lime.....	Quantity	116,102	96,491	2,527		101	113,066	105
	\$	886,538	535,335	23,046		381	29,514	24
Sand and Gravel.....	Quantity	2,874	5,427	2,222	1		718,630	3,641
	\$	23,174	44,464	15,032	8		205,817	883
Stone.....	Quantity	1,650	8,802	262			830,615	2,399
	\$	15,009	68,831	2,710			224,687	568
<i>Total.....</i>	<i>Quantity</i>	<i>276,531</i>	<i>426,926</i>	<i>6,139</i>	<i>251</i>	<i>4,537</i>	<i>1,998,941</i>	<i>14,029</i>
	\$	<i>1,901,912</i>	<i>2,847,025</i>	<i>51,404</i>	<i>1,923</i>	<i>12,681</i>	<i>547,177</i>	<i>3,069</i>
Grand Total.....	Quantity	1,452,018	1,027,468	23,342	4,974	165,647	4,124,593	88,792
	\$	7,713,080	7,128,765	210,143	50,922	334,260	1,197,448	22,750

in the Mineral Industry in Canada, by Kinds and Industries, 1941

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use	Electricity generated for sale	Process supplies †	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
148,640	3,555				15,800		29,827,870	3,722,000			
58,118	43,750			4	474	155,518		25,408	68,489	45,889	62,465
6,177,622	89,450				947,503,696		101,439,755	4,909,703			
940,296	456,306			11,936	6,277,626	8,462,618		149,489	21,066,900	916,323	2,678,508
859,179	1,370				251,488,789		115,243,642	1,905,039			
84,331	6,118			669	841,681	1,261,567		20,752	5,505,955	1,873,728	25,964,492
3,645	285				2,484,720						
3,523	1,739				22,165	40,875			59,761	7,017	18,719
634,786	601				60,842,728		24,273,762	32,101			
105,914	6,334			16	319,679	610,168		11,593	689,284	1,584,610	740,703
514,180	135				151,292,938						
51,957	540				414,909	572,572			6,641,876		
715,723	10,167				14,989,388		2,200,000				
96,440	52,375				90,340	359,005			217,494	233,904	545,160
32,350,238	5,565	2,676	460		5,676,597,814		265,318,979	31,271,000	(c)		
1,986,921	35,100	2,748	303	16,141	14,406,282	26,771,809		149,900	19,272,162		
41,404,013	111,128	2,676	460		7,105,276,873		538,304,008	41,839,843			
3,324,500	602,271	2,748	303	28,766	22,373,156	38,237,132		357,142	53,521,921	4,661,471	30,010,047
82,408	57				154,833,047		33,095,145	3,892,696			
14,366	816				1,731,096	3,544,920		79,740	6,135,694		
	108	500	467,934		18,190						
	850	210	74,936		971	103,229			4,075		
133,294	43	35	7,224,541		2,459,116						
9,053	152	12	549,013	846	30,803	609,616			194,182		
215,702	208	535	7,692,475		157,310,553		33,095,145	3,892,696			
23,419	1,818	222	623,949	846	1,762,870	4,257,765		79,740	6,334,851		
47,999					135,701,258						
8,197					1,004,637	1,524,450			2,721,796		
85,442	737				1,846,671		990,943		159,818		
12,872	2,361			4	20,050	91,165					
124,342	508		8,542		13,638,366		331,185				
12,361	2,678		3,424		72,953	222,564			220,444		
400	3,000				200,000				5,697		
47	12,000				3,207	15,697					
90	375				305,500		1,300				
40	1,515			10	4,290	17,705			21,824		
3,070	469				313,211				145		
743	1,076				6,797	17,327					
48,930				39	2,755,387		5,198,019		69,341		
5,422				21	14,876	450,291					
11,197	70				1,849,225		107,724		28,324		
1,638	210				21,341	26,882					
2,853,275	4,460	181,795			5,005,789		1,610,948		315,521		
142,800	16,224	21,270			53,352	482,043					
3,174,745	9,617	181,795	8,581		161,615,407		8,239,819				
184,120	36,064	21,270	3,445	14	1,201,503	2,848,124			3,551,910		
41,911	35				151,815,680						
4,966	127				748,631	2,897,383			887,041		
444,006	42,887	827	668,965		13,581,151		269,000		207,247		
32,898	170,411	335	19,639		181,904	1,561,326					
644,704	66,368		49,994		13,325,379		1,478,083		188,387		
27,537	241,556		16,530	1,236	79,427	2,008,142					
276,667	3		135		5,657,545				85,004		
32,381	37		77	5	67,765	389,643					
185,081	2,364		3,000		21,527,523		252,300		641,098		
21,637	8,909		1,867	71	295,094	642,085					
1,592,269	111,657	827	722,094		205,937,278		1,999,383				
119,422	221,040	335	38,113	1,312	1,372,821	7,498,579			2,008,777		
46,386,829	232,610	185,833	8,423,610		7,630,138,911		581,638,355	45,732,539			
3,651,461	1,061,193	24,575	665,810	30,938	26,710,350	52,841,600		436,882	65,417,459	4,661,471	30,010,047

Table 32.—Fuel and Electricity Used for All Purposes

Province	Bituminous		Anthracite coal		Lignite coal	Coke	Gasoline	Kerosene
	Canadian	Imported	From United States	From other countries				
	Tons	Tons	Tons	Tons	Tons	Tons	Imp. gal.	Imp. gal.
Nova Scotia.....Quantity	426,077					4,865	227,988	624
\$	1,495,720					28,127	52,627	124
New Brunswick.....Quantity	19,664	11					60,258	246
\$	113,291	211					15,017	48
Quebec.....Quantity	381,037	245,416	18,647	4,391		5,243	1,106,471	20,086
\$	2,917,102	1,882,254	165,020	38,980		59,427	333,180	4,225
Ontario.....Quantity	161,003	781,745	4,401	542	1	319,095	1,710,125	40,325
\$	1,061,935	5,241,255	38,090	10,693	10	3,226,528	472,752	9,164
Manitoba.....Quantity	61,024	63	49		15,980	288	165,559	3,908
\$	508,373	694	1,027		55,367	3,786	53,702	1,061
Saskatchewan.....Quantity	34,703		153		41,119	15	198,010	1,734
\$	255,216		1,644		67,885	263	52,640	459
Alberta.....Quantity	147,285				25,914		115,525	8,344
\$	391,488				33,893		29,538	1,857
British Columbia.....Quantity	221,212	229	70	41	82,633	78,937	466,229	10,371
\$	969,478	4,148	2,117	1,249	177,105	721,665	142,176	2,581
Yukon.....Quantity		4	22			1	46,062	2,988
\$		203	2,245			109	33,248	8,192
Northwest Territories....Quantity	13						27,466	76
\$	477						12,568	39
Canada.....Quantity	1,452,018	1,027,468	23,342	4,974	165,647	408,444	4,124,593	88,702
\$	7,713,080	7,128,765	210,143	50,922	334,260	4,039,905	1,197,448	22,750

(a) On outgoing shipments only.

(b) Paid by mine operator only.

Table 33.—Fuel and Electricity Used only for Metallurgical

Province	Bituminous coal		Anthracite coal		Lignite coal	Coke
	Canadian	Imported	From United States	From other Countries		
	Tons	Tons	Tons	Tons	Tons	Tons
Quebec.....Quantity	117,565	405				3,871
\$	920,158	3,133				45,972
Ontario.....Quantity	123,012	363,694				279,838
\$	759,850	2,500,689				2,976,351
Manitoba.....Quantity	31,547					
\$	269,542					
Saskatchewan.....Quantity	21,031					
\$	179,694					
British Columbia.....Quantity	89,079					77,766
\$	421,998					710,095
Canada.....Quantity	382,234	364,099				361,475
\$	2,551,242	2,503,822				3,732,418

* All used in the non-ferrous smelting and refining industry and included in table 32.

in the Mineral Industry in Canada, by Provinces, 1941

Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased (e)	Total	Electricity generated for own use	Electricity generated for sale	Process Supplies	Freight (a)	Treatment charges (b)
		Manu- factured	Natural								
Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.	K.W.H.	\$	\$	\$
188,843 19,688	4,985 16,497	181,795 21,270			102,937,899 1,120,454	2,754,507	11,297,399		3,882,883	1,127	8,188
9,841 1,013	13,390 49,079		38,905 15,569	1,236	3,026,296 60,222	255,636	137,185		166,099		
15,500,541 1,044,779	70,610 306,314	2,676 2,748		16	4,466,004,507 12,914,024	19,668,069	270,439,170	30,585,872 146,624	19,614,608	1,227,538	15,190,517
21,593,597 1,640,288	71,738 333,359	1,362 557	240,346 63,293	13,756	1,701,820,009 7,645,566	19,757,246	19,715,266	852,200 4,691	29,304,960	620,873	1,935,226
124,044 27,518	19,082 93,206			1,840	266,392,950 457,548	1,204,122	11,134,070		2,374,578	281,313	5,855,210
2,763,898 150,060	532 4,037		1,130 113	1,228	149,917,186 167,909	701,454	18,615,320		1,508,057	18,783	3,394,340
135,690 9,480	3,977 16,391		8,143,229 586,835		48,428,623 515,348	1,584,830	10,813,312	345,819 22,523	1,901,424		
5,724,484 626,533	39,003 140,628			12,016	887,750,951 3,771,371	6,571,067	195,663,997	6,328,626 88,285	6,207,521	2,355,168	3,484,707
154,832 85,083	2,910 41,330					165,410	29,999,557	3,754,101 37,001	104,534	151,068	114,267
191,059 47,019	6,383 60,352			846	3,860,490 57,908	179,209	13,823,079	3,865,921 137,758	352,795	5,601	27,592
46,386,829 3,651,461	232,610 1,061,193	185,833 24,575	8,423,610 665,810	30,938	7,630,138,911 26,710,350	52,841,600	581,638,355	45,732,539 436,882	65,417,459	4,661,471	30,610,947

Purposes in the Mineral Industry of Canada, by Provinces, 1941*

Gasolene	Kerosene	Fuel oil and diesel oil	Wood	Gas		Other fuel	Electricity purchased	Total	Electricity generated for own use
				Manu- factured	Natural				
Imp. gal.	Imp. gal.	Imp. gal.	Cords	M cu. ft.	M cu. ft.	\$	K.W.H.	\$	K.W.H.
6,213 1,834	1,879 410	13,697,923 808,639	2,200 10,995	2,676 2,748			3,738,250,834 8,794,792	10,588,681	256,177,056
31,414 8,241		17,567,265 1,052,498	2,485 18,086		460 303	13,742	293,377,153 956,193	8,285,953	
287 116		8,181 1,253	55 313			1,439	130,297,680 85,998	358,661	
192 77		5,454 835	37 208			960	86,865,120 57,333	239,107	
96,339 31,465		1,046,908 120,121	763 5,308				700,340,465 2,649,135	3,938,122	
134,445 41,733	1,879 410	32,325,731 1,983,346	5,540 34,910	2,676 2,748	460 303	16,141	4,949,131,252 12,543,451	23,410,524	256,177,056

Table 34.—Electricity Purchased by

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total entire mining industry	
	K.W.H.	\$*	K.W.H.	\$*	K.W.H.	\$*
1925.....	160,192,738	1,413,861	612,062,882	3,542,342	944,819,733	6,927,280
1926.....	169,287,220	1,547,152	1,215,488,195	4,992,979	1,604,089,435	8,780,863
1927.....	221,866,174	1,742,860	1,490,457,194	5,509,534	1,799,505,643	8,025,375
1928.....	224,756,744	2,002,062	1,530,612,608	6,271,434	1,856,391,170	9,072,073
1929.....	233,219,275	1,983,959	1,662,142,083	6,934,286	2,054,411,658	10,353,034
1930 (a).....	213,116,298	1,927,268	1,752,490,909	7,535,324	2,151,082,619	10,929,340
1931 (b).....	253,436,606	2,222,870	1,874,324,568	7,309,118	2,213,264,599	10,514,814
1932.....	314,326,323	2,516,897	1,499,911,795	6,626,600	1,758,083,427	9,615,706
1933.....	317,550,168	2,661,852	1,688,075,040	7,115,894	1,908,779,501	9,966,904

* Includes service charges.

(a) 1925 to 1930 for power only.

(b) 1931-1941 for all purposes.

Table 35.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE

Province	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
Nova Scotia.....	No. 56	30	69	2	157	894	1,051	185	93
H.P. 50,183	3,151	2,903	540	56,777	61,692	118,469	9,314	27,503	
New Brunswick.....	No. 21	2	49	.....	72	252	324	15	17
H.P. 1,820	200	1,256	.....	3,276	2,470	5,746	257	1,085	
Quebec.....	No. 50	66	269	16	401	7,738	8,139	428	106
H.P. 10,514	9,972	10,259	53,285	84,080	329,692	413,722	4,486	16,114	
Ontario.....	No. 147	67	477	4	695	12,895	13,590	832	236
H.P. 14,538	8,618	15,924	2,150	41,230	471,124	512,354	10,419	30,585	
Manitoba.....	No. 10	10	38	1	59	1,406	1,465	153	27
H.P. 2,113	1,345	1,016	1,900	6,374	74,041	89,415	4,378	3,406	
Saskatchewan.....	No. 15	35	47	2	99	928	1,027	243	17
H.P. 1,465	2,699	1,571	3,300	9,035	44,871	53,906	4,509	2,530	
Alberta.....	No. 194	12	187	1,190	1,565	287	1,870	223	225
H.P. 37,708	942	6,161	32,938	77,749	8,749	86,498	6,348	24,777	
British Columbia.....	No. 90	111	175	56	432	4,307	4,739	1,645	51
H.P. 33,921	16,113	5,428	34,522	89,984	192,085	282,069	43,596	9,931	
Yukon.....	No. 4	17	4	3	28	.....	28	372	7
H.P. 45	1,866	42	15,000	16,953	.....	16,953	16,301	100	
N.W.T.....	No. 1	2	1	4	.....	135	139	3	9
H.P. 156	8	4,700	4,864	2,186	7,050	1,393	610	.....
Canada.....	No. 587	351	1,317	1,275	3,530	28,842	32,372	4,099	788
H.P. 152,307	45,062	44,568	148,335	390,272	1,186,910	1,577,182	101,001	116,641	

Canadian Mining Industry, 1925-1941

Year	Auriferous Quartz Mining (gold mines)		Total All Metal Mines (including non-ferrous smelters and refineries)		Total entire mining industry	
	K.W.H.	\$*	K.W.H.	\$*	K.W.H.	\$*
1934.....	415,570,323	3,091,147	2,099,586,731	8,433,428	2,359,525,280	11,510,481
1935.....	464,146,582	3,722,163	2,320,385,917	9,415,062	2,591,470,745	12,546,298
1936.....	449,026,003	4,345,066	2,841,045,187	10,783,296	3,151,192,519	14,055,915
1937.....	629,083,378	5,031,691	3,368,047,901	12,442,423	3,744,919,549	16,135,702
1938.....	741,866,953	5,333,427	4,125,037,129	13,917,518	4,441,098,287	17,485,652
1939.....	777,832,223	5,803,160	4,449,477,330	13,060,673	4,817,050,497	18,749,417
1940.....	868,846,323	5,893,562	5,105,497,931	17,005,546	5,569,961,386	21,066,734
1941.....	947,563,696	6,277,626	7,105,275,873	22,373,156	7,630,138,911	26,710,350

Reserve or Idle, in the Mineral Industry in Canada, by Provinces, 1941

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
9	2	24	.....	35	26	61	37	18
1,132	214	1,723	.....	3,069	447	3,516	2,319	4,392
3	1	1	.....	6	19	24	.....	5
120	150	1	.....	271	176	447	.....	315
12	26	72	.....	110	751	861	59	58
658	3,146	4,218	.....	8,032	24,954	32,976	613	8,341
31	23	87	.....	141	1,061	1,202	45	46
2,285	3,647	5,770	.....	11,702	47,256	58,958	654	3,107
3	1	8	.....	12	94	106	7	8
1,379	350	519	.....	2,248	2,699	4,947	670	964
6	5	10	.....	21	67	88	54	10
2,029	1,040	218	.....	3,287	1,376	4,663	1,108	1,040
35	.....	41	.....	76	44	120	9	32
8,014	.....	1,695	.....	9,709	1,908	11,617	220	3,484
14	22	38	15	89	671	760	95	13
13,352	1,756	638	2,450	18,196	14,685	32,881	2,319	1,226
.....	2	1	.....	3	.....	3	78	3
.....	202	28	.....	230	.....	230	4,562	181
.....	11	1	.....	12	4	16	72	2
.....	1,324	10	.....	1,334	17	1,351	1,509	65
113	93	283	15	504	2,737	3,241	456	195
28,969	11,829	14,820	2,450	58,068	93,518	151,586	13,974	23,115

**Table 36.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE**

Industry	Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
METAL MINING—									
Alluvial Gold Mines.....No.	6	41	72	8	187	1	128	308	6
H.P.	130	2,498	1,586	16,252	20,466	12	20,478	15,821	88
Auriferous Quartz Mines.....No.	25	104	112	28	269	9,896	10,165	1,630	209
H.P.	2,550	19,698	5,244	23,010	50,502	376,280	426,782	26,494	17,085
Copper-Gold-Silver Mines.....No.	2	12	7	8	29	2,236	2,265	427	26
H.P.	17,333	3,270	109	10,520	31,232	81,030	112,262	17,190	5,747
Silver-Cobalt Mines.....No.			1		1	51	52		2
H.P.			40		40	1,152	1,192		175
Silver-Lead-Zinc Mines.....No.	3	27	4	5	39	675	714	429	12
H.P.	4,142	3,791	16	950	8,899	20,247	29,146	8,056	2,316
Nickel-Copper Mines.....No.		1			1	852	853		5
H.P.		150			150	55,999	56,149		510
Miscellaneous Metal Mines.....No.		12	20		32	128	160	52	6
H.P.		1,420	600		2,020	4,739	6,759	480	500
Non-ferrous Smelting and Refining.....No.	35	2	3	11	51	8,342	8,393	315	38
H.P.	15,096	375	220	51,125	66,816	380,022	446,838	3,768	20,215
Total.....No.	71	199	219	60	549	22,181	22,730	3,161	304
H.P.	39,251	31,202	7,815	101,857	180,125	919,481	1,099,606	71,809	46,636
NON-METAL MINING, INCLUDING FUELS—									
Coal.....No.	229	9	193	2	433	2,568	3,001	374	210
H.P.	75,726	488	3,575	12,000	91,789	103,284	195,073	20,980	44,480
Natural Gas.....No.	5		215		220	32	252	13	7
H.P.	175		5,709		5,884	704	6,588	202	270
Petroleum.....No.	72	5	112		189	158	347	15	114
H.P.	22,999	830	4,432		28,261	1,033	29,294	317	9,788
Total.....No.	306	14	520	2	842	2,758	3,600	402	331
H.P.	98,900	1,318	13,716	12,000	125,934	105,021	230,955	21,499	54,538
Other Non-Metal Mining									
Asbestos.....No.	6	1	34		41	1,065	1,106		3
H.P.	210	120	2,366		2,696	54,349	57,045		80
Feldspar, nepheline-syenite and Quartz No.	7	6	19		32	65	97	107	8
H.P.	608	927	906		2,441	1,034	3,475	907	730
Gypsum.....No.	13	20	46		79	160	239	35	6
H.P.	1,385	2,526	2,219		6,130	5,251	11,381	832	815
Iron Oxides.....No.						7	7		
H.P.						86	86		
Mica.....No.	6		20	1	27	4	31	6	
H.P.	180		431	145	756	100	856	90	
Peat.....No.	1		32		33	41	74		1
H.P.	40		716		756	492	1,248		15
Salt.....No.	27	1	5		33	137	170	197	7
H.P.	3,328	180	246		3,754	980	4,734	2,097	3,836
Talc and Soap-stone.....No.		2	15		17	32	49	12	
H.P.		242	500		742	856	1,598	120	
Miscellaneous.....No.	10	12	23	2	47	153	200	65	6
H.P.	218	1,103	902	150	2,373	3,101	5,474	794	385
Total.....No.	70	42	194	3	309	1,664	1,973	422	31
H.P.	5,969	5,098	8,286	295	19,648	66,249	85,897	4,840	5,861

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1941

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
3	3	11	3	20		20	52	4
77	111	145	30	363		363	4,300	71
15	71	116	5	207	659	866	207	82
1,324	8,601	8,139	1,720	19,784	19,989	39,773	3,198	5,231
7	3	3		18	155	168	51	12
12,708	780	410		18,898	3,756	17,654	2,821	1,174
	1			1	18	19		2
	120			120	544	664		80
1	5	3	3	12	92	104	33	3
2,000	472	160	550	3,182	3,812	6,994	326	270
					78	78		
					2,244	2,244		
	1	3		4	3	7		
	150	190		340	85	425		
1				2	1,110	1,112	25	6
1,074	75			1,149	37,292	38,441	319	5,150
27	85	136	11	259	2,115	2,374	368	109
17,183	10,309	9,044	2,300	38,836	67,722	106,558	10,964	11,976
40	1	37		78	76	154	28	39
9,701	30	1,019		10,750	1,491	12,241	1,779	7,235
1		3		4	7	11		
35		96		131	57	188		
7		30		57	7	44	4	9
514		1,292		1,806	98	1,904	195	800
48	1	70		119	90	209	32	48
10,250	30	2,407		12,687	1,646	14,333	1,974	8,035
					43	43		
					3,437	3,437		
	2	3		5	2	7		1
	475	7		482	35	517		50
3		15		18	23	41	13	5
110		943		1,063	858	1,911	465	375
3		1		4		4	1	1
97		10		107		107	1	12
		4		4		8		
		103		103	23	126		
7		1		8	3	11	3	7
190		120		510	11	321	15	1,135
1		1		2	5	7		
36		29		65	320	385		
2	3	6		11	9	20	31	
35	890	252		1,177	330	1,507	228	
16	5	31		52	89	141	48	14
468	1,365	1,464		3,297	5,014	8,311	709	1,572

**Table 36.—Power Equipment in Use, and Power Equipment in
ORDINARILY IN USE**

Industry	Steam engines and turbines	Diesel engines	Gasoline, gas and oil engines other than Diesel engines	Hydraulic turbines or water power wheels	Total primary power	Electric motors run by purchased	Total power employed	Electric motors run by primary power in same plant	Boilers
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS—									
Cement.....No.	2	3	48	.....	53	1,435	1,488	18	9
H.P.	107	825	2,139	.....	3,071	76,264	79,335	1,086	515
Clay Products...No.	49	12	52	.....	113	543	656	19	49
H.P.	4,576	570	1,489	.....	6,635	13,786	20,421	134	4,864
Lime.....No.	10	6	23	.....	39	406	445	54	14
H.P.	266	600	862	.....	1,728	7,089	8,817	843	1,683
Sand and Gravel..No.	16	24	71	7	118	202	320	.....	13
H.P.	911	1,615	3,114	240	5,880	6,916	12,796	.....	790
Stone.....No.	63	51	190	13	317	843	1,160	23	37
H.P.	2,327	3,834	7,147	1,005	14,513	25,042	39,355	790	1,754
Total.....No.	140	96	384	20	640	3,429	4,069	114	122
H.P.	8,187	7,444	14,751	1,245	31,627	129,097	160,724	2,853	9,606
Grand Total 1941..No.	587	351	1,317	85	2,340	30,032	32,372	4,099	788
H.P.	152,307	45,062	44,568	115,397	357,334	1,219,848	1,577,182	101,001	116,641
Grand Total 1940..No.	576	358	1,133	84	2,151	28,135	30,286	3,831	850
H.P.	148,646	43,536	42,076	105,477	339,735	1,158,043	1,497,778	97,042	122,239

Reserve or Idle, in the Mineral Industry in Canada, by Industries, 1941—Concluded

IN RESERVE OR IDLE

Steam engines and turbines	Diesel engines	Gasolene, gas and oil engines other than Diesel engines	Hydraulic turbines or water wheels	Total primary power	Electric motors run by purchased power	Total power employed	Electric motors run by primary power in same plant	Boilers
1		4		5	297	302	3	2
50		222		272	13,629	13,901	212	90
4		8		12	50	62		13
230		424		654	2,016	2,670		1,055
1		1		2	4	6		3
25		10		55	213	248		117
2		3		5	10	15	2	
38		125		163	275	438	45	
14	2	30	4	50	82	132	3	6
725	125	1,124	150	2,124	3,003	5,127	70	270
22	2	46	4	74	443	517	8	24
1,068	125	1,905	150	3,248	19,136	22,384	327	1,532
113	93	283	15	504	2,737	3,241	456	195
28,969	11,829	14,820	2,450	58,068	93,518	151,586	13,974	23,115
129	78	250	21	478	2,316	2,794	260	177
31,531	10,081	13,882	3,023	58,517	84,022	142,539	11,624	17,130

Table 38.—Tonnage of Ore Mined and Rock Quarried in the Canadian Mining Industry, 1922-1941

	1941	1940	1939	1938	1937
Gold quartz ores.....	20,031,736	18,986,306	17,105,744	14,749,649	12,388,489
Copper-gold-silver ores.....	9,263,071	8,931,291	8,474,855	7,929,434	6,749,809
Nickel-copper ores.....	9,974,272	8,361,532	7,859,496	6,282,799	6,322,062
Silver-cobalt ores.....	11,507	43,245	60,431	59,408	56,878
Silver-lead-zinc ores.....	2,816,974	2,640,973	2,195,138	2,387,167	2,524,548
Miscellaneous metals.....	883,851	306,056	191,654	1,307	17,509
Asbestos.....	7,707,367	7,612,150	6,650,416	5,816,368	6,477,805
Feldspar and nepheline syenite.....	57,861	101,645	79,346	50,768	53,901
Quartz.....	335,085	228,065	273,839	450,246	450,740
Gypsum.....	1,532,228	1,466,820	1,532,423	1,084,057	1,151,064
Talc and soapstone.....	38,067	20,514	14,111	10,366	7,271
Iron oxides.....	15,917	15,623	10,049	8,919	7,665
Other non-metals.....	412,159	306,765	216,253	179,932	243,670
Stone, all kinds, quarries (exclusive of stone used for cement and lime).....	7,940,801	7,447,665	5,443,522	5,116,022	6,935,612
Stone used for the manufacture of cement (estimated from 1922-1929).....	2,086,781	1,765,944	1,379,858	1,344,868	1,465,168
Estimate rock for the manufacture of lime.....	1,530,200	1,280,949	900,000	867,583	976,900
Total.....	64,637,877	59,515,543	52,387,135	46,338,893	45,829,091

	1936	1935	1934	1933	1932
Gold-quartz ores.....	10,694,208	8,832,901	7,846,854	6,528,854	6,072,665
Copper-gold-silver ores.....	5,052,222	5,650,665	6,065,692	5,448,690	5,453,173
Nickel-copper ores.....	4,666,554	3,699,845	2,989,988	1,533,887	826,041
Silver-cobalt ores.....	59,592	57,287	54,498	60,317	70,442
Silver-lead-zinc ores.....	2,196,482	2,134,749	1,856,256	1,457,452	1,532,628
Miscellaneous metals.....	9,440	4,970	3,618	3,000	77
Asbestos.....	4,692,004	2,852,118	2,320,750	1,566,919	1,145,340
Feldspar and nepheline syenite.....	20,703	15,706	18,302	10,658	4,903
Quartz.....	249,960	226,857	272,563	155,783	207,031
Gypsum.....	841,116	562,471	488,066	370,591	437,153
Talc and soapstone.....	25,052	13,909	15,050	16,626	13,275
Iron oxides.....	7,223	6,152	6,132	4,379	14,262
Other non-metals.....	231,849	128,415	173,669	129,514	52,154
Stone, all kinds, quarries (exclusive of stone used for cement and lime).....	4,982,912	4,317,947	4,077,754	2,939,824	4,691,172
Stone used for the manufacture of cement (estimated from 1922-1929).....	1,180,358	818,443	806,546	616,364	1,141,376
Estimate rock for the manufacture of lime.....	800,000	700,000	600,000	573,726	569,500
Total.....	35,709,675	30,022,435	27,595,788	21,446,584	22,231,192

	1931	1930	1929	1928	1927
Gold quartz ores.....	5,565,426	4,472,803	4,354,744	4,601,628	4,605,190
Copper-gold-silver ores.....	6,002,865	5,768,664	5,134,824	4,262,822	3,636,759
Nickel-copper ores.....	1,714,075	2,127,043	1,991,910	1,457,910	1,305,917
Silver-cobalt ores.....	200,729	223,432	242,591	260,644	303,134
Silver-lead-zinc ores.....	1,710,732	2,244,970	2,208,270	2,097,179	1,763,660
Miscellaneous metals.....	1,608				
Asbestos.....	2,274,048	4,901,206	6,208,970	5,171,060	4,834,761
Feldspar and nepheline syenite.....	13,897	26,796	37,527	31,897	31,484
Quartz.....	180,110	226,200	265,949	290,721	245,318
Gypsum.....	882,880	1,070,968	1,211,689	1,311,642	1,105,704
Talc and soapstone.....	21,916	11,841		17,076	16,521
Iron oxides.....	12,465	6,596		10,841	7,767
Other non-metals.....	120,205				
Stone, all kinds, quarries (exclusive of stone used for cement and lime).....	8,398,110	9,994,656	9,622,424	8,253,804	7,306,436
Stone used for the manufacture of cement (estimated from 1922-1929).....	2,489,147	2,925,399	3,000,000	2,800,000	2,400,000
Estimate rock for the manufacture of lime.....	610,000	874,000	1,203,000	905,000	790,000
Total.....	30,198,213	34,874,574	35,481,898	31,472,224	28,352,651

Table 38.—Tonnage of Ore Mined and Rock Quarried in the Canadian Mining Industry, 1922-1941—Concluded

	1926	1925	1924	1923	1922
Gold quartz ores.....	4,031,035	3,646,460	3,096,290	2,478,912	2,431,340
Copper-gold-silver ores.....	3,210,321	2,518,849	2,232,085	1,690,073	1,004,097
Nickel-copper ores.....	1,322,050	1,264,748	1,411,978	1,187,355	259,569
Silver-cobalt ores.....	336,066	357,029	433,176	437,222	426,445
Silver-lead-zinc ores.....	1,565,158	1,474,764	1,200,039	636,498	505,774
Miscellaneous metals.....					
Asbestos.....	4,002,626	4,120,214	3,323,505	3,768,542	2,562,933
Feldspar and nepheline syenite.....	35,951		44,804		
Quartz.....	238,343	197,224	150,896	272,070	125,245
Gypsum.....	931,193	705,852	703,733	558,853	484,629
Talc and soapstone.....	16,650	15,390	11,240	10,235	
Iron oxides.....	6,626	13,225			
Other non-metals.....					
Stone, all kinds, quarries (exclusive of stone used for cement and lime).....	6,397,590	5,706,119	4,768,014	4,111,334	3,639,081
Stone used for the manufacture of cement (estimated from 1922-1929).....	2,200,000	1,900,000	1,900,000	1,900,000	1,600,000
Estimate rock for the manufacture of lime.....	715,700	637,000	570,000	625,000	561,000
Total.....	25,009,309	22,556,874	19,845,760	17,676,094	13,600,113

TAX EXEMPTION TO NEW MINES

With a view to stimulating exploration and development of mineral resources in Canada, certain exemptions from income tax have been granted from time to time to new or re-opened mines coming into production. An amendment to the Income War Tax Act, made in May, 1936, provided that any metalliferous mine coming into production between May 1, 1936 and January 1, 1940 would be exempt from income tax for its first three fiscal periods following the commencement of production. The Minister of National Revenue, having regard to the production of ore in reasonable commercial quantities, determines which mines, whether new or old, qualify for this exemption, and a certificate is issued accordingly. In the 1939 session of Parliament an amendment to the Income Tax Act extended for a further three years the qualifying period for the above three-year exemption from January 1, 1940 to January 1, 1943.

In order to stimulate the production of wartime metals Parliament in the 1942 session provided a three-year exemption from the excess profits tax for the profits of any company derived from the operation of any base metal or strategic mineral mine coming into production in the three years following after January 1, 1943. The Minister of National Revenue was given power to determine what mine, whether new or old, and what types of minerals would qualify for this exemption. Section 89 of the Income War Tax Act was not extended and will have application only to the period now mentioned in the statute.

Provision is made for an exemption from tax in respect of dividends paid to a company incorporated in Canada by a company which has never paid a tax by reason of the three-year exemption. It might be explained that under the Income Tax Act a corporation is exempt from tax on dividends received from another corporation if the paying corporation has already paid corporation income tax on its earnings. This is to avoid double taxation of corporate earnings. It is seen, therefore, that but for this provision a receiving corporation would automatically lose the exemption (which it would otherwise enjoy) through the fact that the paying corporation had received the three-year exemption accorded to new mines and thus the purpose of the Government in allowing the three-year exemption would be defeated.

General regulations covering depletion allowance to precious metal mines are unchanged from the previous year and remain on the basis of $33\frac{1}{3}$ per cent for mining companies, with the allowance in the case of dividends received by shareholders standing at 20 per cent.

A copy of Bill 104—The Excess Profits Tax Act, 1940—is contained in the Dominion Bureau of Statistics Gold Mining Report for 1939. Bill 78, an Act to amend Bill 104 referred to above, was passed by the House of Commons on May 26, 1941, and is reprinted in the 1940 report. A copy of Bill 122, the 1942 amendment to the Act, is contained in the Dominion Bureau of Statistics Gold Mining Report for 1941.

As a companion measure to the above-mentioned exemption from excess profits tax, an amendment was made to the Income War Tax Act, designed to encourage prospecting for strategic minerals. It provided that persons contributing in 1942 to prospecting syndicates, associations or mining partnerships registered or otherwise recognized under the laws of any of the provinces, will be allowed a deduction from their income tax otherwise payable, equal to forty per cent of such contributions, provided that the tax credit will apply only in respect of contributions up to \$500 in the case of any one syndicate, association or mining partnership, and only in respect of total contributions not exceeding \$5,000 in the case of any one taxpayer. Mining corporations and exploration companies will also be allowed a deduction from tax equal to forty per cent of amounts up to \$5,000 actually expended in sending out their own prospectors.

WARTIME MINE SHOP ASSOCIATION

Prepared by: Oliver Hall,
President, Ontario Mining Association,
Edited by: C. B. Stenning,
Department of Munitions and Supply.

Representatives of the mining industry were called to Ottawa in May, 1941 and told of the need for war equipment and urgently asked to start making war equipment in their shops. The industry agreed and the work was organized by the seven mining associations in the various provinces and by the Canadian Institute of Mining and Metallurgy.

In the early stages there were naturally many difficulties. The mines were exceedingly busy turning out essential metals and the men at the mines had been heavily drawn on by the active forces. The shops at the mines were repair shops and in distant areas far from manufacturing centres. There has always, however, been a determination at the mines to place all war needs first and the men in the shops at the mines, to a man, have pushed the war work in the shops. It is now on a very satisfactory basis.

The censor requests that direct references and specific mention of places and work be avoided and the most interesting data on this work cannot be given.

At one of the large mining centres in the west large marine engines were delivered at a rate that could not be exceeded in the largest shops of the central cities. At a second exceedingly busy metallurgical plant units of an important gun contract are going out. Large orders for engines and pumps for the merchant ships are underway in the gold centres. The important areas in the east are all busy.

Some of the contracts run to the end of the war, others are for specific quantities of engines or pumps with assurance that there will be repeat orders. All told, orders are well above two million dollars. The work is underway. The mining industry will do its utmost.

Table 39.—Mining Accidents in 1941

Cause of Accident	Nova Scotia		New Brunswick		Quebec		Ontario		Manitoba		Saskatchewan		Alberta		British Columbia		Yukon		North-west Territories		Canada	
	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal
UNDERGROUND—																						
Falls or roof or face.....	11	609	1	149	10	98	18	90	1	54	...	54	5	77	5	533	...	1	...	1	51	1,966
Mine cars and locomotives.....	4	663	...	59	2	117	3	34	1	19	2	47	4	56	3	155	...	...	...	1	19	1,151
Gas and dust explosions.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	36	15
Explosives.....	2	3	1	6	6	16	6	18	...	4	...	3	35	2	1	6	...	...	...	16	58	...
Electricity.....	...	...	...	2	...	1	...	...	1	...	...	9	...	...	...	3	...	...	...	1	18	...
Timbering.....	...	...	...	...	...	22	2	...	1	...	...	11	...	17	...	...	...	...	...	3	50	...
Mining and loading coal.....	...	...	...	22	...	...	...	...	...	...	...	142	19	...	...	...	...	...	...	...	161	...
Coal cutting machines.....	13	1,247	...	182	11	772	25	1,442	...	119	1	135	1	22	4	1,199	...	1	...	1	55	5,127
Miscellaneous.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	30	2,825	2	427	29	1,026	54	1,588	4	196	3	413	45	201	14	1,904	...	2	...	3	181	8,555
SURFACE—																						
Haulage.....	...	54	1	27	...	42	...	3	...	26	...	27	...	4	1	30	...	...	...	...	2	214
Machinery.....	...	23	...	43	4	672	...	376	2	150	...	53	1	5	...	50	...	43	...	...	8	482
Miscellaneous.....	...	243	...	...	...	...	...	...	...	...	...	51	1	11	3	679	...	1	...	...	10	2,226
Total.....	...	320	1	79	6	896	1	431	6	241	...	131	2	20	4	759	...	45	...	...	20	2,922
Grand Total 1941	30	3,145	3	506	35	1,922	55	2,019	10	437	3	544	47	221	18	2,663	...	47	...	3	201	11,507
Grand Total 1940	14	2,861	1	570	31	1,207	42	2,123	4	270	5	584	13	176	17	2,534	(a)	(a)	...	...	127	10,335
Grand Total 1939	16	2,706	1	476	18	1,092	51	2,246	4	303	3	509	17	237	17	2,606	(a)	(a)	...	...	127	10,775
Grand Total 1938	44	2,526	...	356	49	1,838	61	2,147	7	401	3	564	20	208	23	2,432	(a)	(a)	...	...	207	10,492
Grand Total 1937	12	783	...	208	8	349	25	1,513	...	...	...	267	6	169	14	1,061	(a)	(a)	...	...	69	4,350
Grand Total 1928	28	2,575	2	224	24	416	85	2,515	...	...	...	34	28	193	28	1,988	(a)	(a)	...	...	196	7,945

(a) Not compiled.

Table 40.—Population in Specified Canadian Mining Areas, 1941 and 1931 Census of Canada (D.B.S.)

	1941 Population	1931 Population		1941 Population	1931 Population
QUEBEC—			ONTARIO—Conc.		
Rouyn Mining Area—			Little Long Lac Area—		
Hebecourt township.....	371	3	Points on C.N.R. from Long		
Duparquet township.....	722	66	Lac to Beardmore, exclusive		
Destor township.....	828	57	of the town of Geraldton and		
Duprat township.....	62	48	the village of		
Dufresnoy township.....	563	44	Beardmore.....	2,651	568
Clericy township.....	2,193	79	Geraldton town.....	2,979	
Dasserat township.....	31	23	Beardmore village.....	756	
Beauchastel township.....	2,444	172	Total.....	6,386	
Bousquet township.....	78	7			
Cadillac township.....	1,102	54	Timmins Area—		
Malaric township.....	1,347	7	Mountjoy township.....	1,729	1,062
Varsan township.....	900	63	Ogden township.....	30	153
Senneville township.....	185	1	Deloro township.....	574	161
Pascalis township.....	1,059	139	Tisdale township.....	9,461	5,761
Dubuisson township.....	1,314	12	Whitney township.....	1,487	369
Bourlamaque township.....	9		Timmins town.....	28,790	14,200
Louvicoirt township.....	100		Total.....	42,071	21,706
Pershing township.....	3				
Tiblemont township.....	11		Kirkland Lake and Larder		
Rouyn township.....	1,560	300	Lake Area—		
Joannes township.....	430	36	Teck township, including Kirk-		
Noranda town.....	4,576	2,246	land Lake town.....	20,409	9,915
Rouyn town.....	8,808	3,225	Labelle township.....	743	115
Bourlamaque town.....	1,545	(x)	Gauthier township.....	258	22
Malaric town.....	2,895	(x)	McVittie township.....	180	61
Val d'Or town.....	4,385	(x)	McGarry township.....	1,372	85
Cadillac village.....	989	(x)	Larder Lake town.....	1,464	(x)
Duparquet town.....	1,384	(x)	Total.....	24,426	10,198
Total.....	39,874	6,575			
Desmeloizes township—			BRITISH COLUMBIA—		
La Reine & Desmeloizes W....	809	948	Zeballos Area (Census subdivi-		
St. Jacques-de-Dupuy.....	2,383	1,104	sion 5F)—		
La Reine village.....	425	658	Unorganized.....	4,124	2,517
Total.....	3,617	2,710	Indian Reserves.....	663	566
ONTARIO—			Total.....	4,787	3,083
Cobalt, Halleybury Mining			Bridge River Area (Census sub-		
Areas—			division 6F)—		
Bucke township.....	1,069	1,470	Unorganized.....	3,055	1,828
Coleman township.....	708	1,087	Indian Reserves.....	1,052	966
Firstbrook township.....	127	94	Total.....	4,107	2,794
Dymond township.....	1,123	982	Barkerville Area (Census sub-		
Harris township.....	365	357	division 8D)—		
Cobalt town.....	2,376	3,885	Unorganized.....	4,450	1,889
Halleybury town.....	2,268	2,813	Indian Reserves.....	264	254
New Liskeard town.....	3,019	2,880	Quesnel village.....	653	446
Total.....	11,055	13,568	Williams Lake.....	540	402
Red Lake Area.....			Total.....	5,907	2,991
	1,827	600	Hedley Area (Census sub-divi-		
Pickle Crow Area.....			sion 3B)—		
	999	not shown	Penticton district municipality	5,777	4,640
Sudbury Area—			Unorganized.....	9,663	6,219
Garson township.....	1,968	1,218	Indian Reserves.....	400	200
Falconbridge township.....	905	445	Total.....	15,840	11,059
Snider township.....	1,726	1,465	Britannia Area (Census subdivi-		
McKim township.....	5,105	533	sion 4B (part)—		
Creighton township.....	9	50	Britannia mine.....	683	1,497
Graham township.....	93	193	Britannia Beach.....	546	
Denison township.....	183	190	Total.....	1,229	1,497
Drury township.....	318	364			
Neelon township.....	1,009	2,400			
Dowling township.....	398	161			
Levack township.....	40	420			
Blezard township.....	533	523			
Sudbury city.....	32,203	18,518			
Coniston town.....	2,245	(x)			
Frood mine town.....	70	173			
Levack town.....	895	(x)			
Copper Cliff town.....	3,732	3,173			
Total.....	51,432	29,826			

(x) Not incorporated in 1931.

Table 40.—Population in Specified Canadian Mining Areas, 1941 and 1931 Census of Canada (D.B.S.)—(Concluded)

	1941 Population	1931 Population		1941 Population	1931 Population
BRITISH COLUMBIA—Con.			BRITISH COLUMBIA—Con.		
Nelson & Slocan Areas— (Census sub-division 2C)—			Stewart Area (Census sub-division 9C)—		
Unorganized.....	10,447	9,566	Unorganized.....	923	2,702
Indian Reserves.....	81	103	Indian Reserves.....	984	285
Kaslo city.....	468	523	Stewart village.....	446	610
Nelson city.....	5,912	5,992			
Slocan city.....	183	202	Total.....	2,353	3,597
Creston village.....	1,153	695			
New Denver village.....	310	306			
Silverton village.....	207	272			
Total.....	18,761	17,659			
Cranbrook & Chapman Camp and Kimberley Areas (Census sub-division 1B)—			MANITOBA—		
Unorganized.....	7,990	7,612	Flin Flon and Sherridon Areas—		
Indian Reserves.....	209	176	Flin Flon.....	6,845	3,589
Cranbrook city.....	2,568	3,067	Township 64 to 71, Ranges 22 to 29 W. p m.....	1,976	
Chapman Camp village.....	513	(x)	Total.....	8,821	3,589
Total.....	11,280	10,855	God's Lake & District Area...	449	7
Tadanac Area (Census sub-division 2B)—					
Tadanac District Municipality	510	464	NORTHWEST TERRITORIES—		
Unorganized.....	12,156	7,260	Yellowknife Area.....	1,410	Population not shown separately in 1931
Rossland City.....	3,657	2,848			
Trail city.....	9,392	7,573			
Total.....	25,715	18,145			

(x) Not incorporated in 1931.

CHAPTER TWO

THE GOLD MINING INDUSTRY IN CANADA

Including—(a) The Alluvial Gold Mining Industry; (b) The Auriferous Quartz Mining Industry; (c) The Copper-Gold-Silver Mining Industry; (d) Miscellaneous Data on Monetary Gold and World Gold Production, Prices, Exchange, etc.

Definition of the Industry.—Gold mining in Canada is classified into three principal industries—(a) the recovery of gold from the gravels and sands of stream channels or beaches or what is defined as “The Alluvial Gold Mining Industry”; (b) the recovery of lode gold, which is named “The Auriferous Quartz Mining Industry” and in which industry the gold is usually the most important economic constituent of the ores mined and quartz the predominant gangue mineral; (c) gold is often found in various other mineral deposits, more particularly in those of copper, and for this reason the review of Canada’s “Copper-Gold-Silver Mining Industry” is included here to complete a more comprehensive survey of the Canadian Gold Mining Industry.

Canadian gold output, from all primary sources, totalled 5,345,179 fine ounces valued at \$205,789,392 in 1941. This was the greatest output of the metal ever recorded in the history of Canadian gold production and represented an increase of 34,034 fine ounces at \$1,310,309 over the previous high record of 5,311,145 fine ounces valued at \$204,479,083 in 1940. Increases in production over 1940 were attained only in Quebec, Saskatchewan and the Northwest Territories; however, these were sufficiently great to more than compensate the decline recorded in the other gold producing areas of the Dominion. Of the total output in 1941, the mines of Ontario contributed 3,194,308 fine ounces or 59·8 per cent; Quebec, 1,089,339 fine ounces or 20·6 per cent, and British Columbia, 608,203 fine ounces or 11·4 per cent. Production in the Northwest Territories totalling 74,417 fine ounces represents a 34·9 per cent increase over 1940 and reflects the recent mining development of the Yellowknife deposits; this area is Canada’s newest and farthest north producing lode gold camp.

Exploration and development work conducted on several non-producing properties located in various parts of the pre-cambrian shield yielded encouraging results, but restrictions on certain materials and equipment considered necessary in a direct and total war effort retarded or prevented any extensive expansion in the industry. Labour troubles in the Kirkland Lake camp, Ontario, also resulted in a curtailment in output by some of the more important producers.

Production according to type of deposit or nature of recovery included 82·66 per cent from crude gold bullion bars produced at “gold mines”; 10·28 per cent from blister or anode copper; 4·68 per cent from copper-nickel matte, ores, slags, etc. exported; 1·99 per cent from alluvial deposits, and 0·39 per cent from base bullion made chiefly from silver-lead ores.

Reliable data relating to world gold production since the commencement of the war in 1939 have been increasingly difficult to obtain. From statistics made available, it is estimated that Canada, as a world gold producer, ranked probably second in the quantity of the precious metal produced. The Union of South Africa ranked a definite first, while production of the United States, including the output in the Philippine Islands, was estimated at approximately 5,980,746 fine ounces. Final figures of production in the Philippines will be difficult to obtain owing to the invasion of the Islands by Japan. Accurate data pertaining to gold production in Russia are unobtainable, but a conjectural total output of 4,000,000 fine ounces was reported for this country in 1940.

Table 41.—Production of New Gold in Canada, by Provinces and Sources, 1940 and 1941
(Gold at \$20·671834 per fine ounce)

	1940		1941	
	Fine troy ounces	\$	Fine troy ounces	\$
NOVA SCOTIA—				
In gold bullion.....	22,219	459,307	19,170	396,279
Estimated exchange equalization on gold produced.....		396,125		341,766
Total Value—Canadian Funds.....		855,432		738,045
QUEBEC—				
In anode copper, in ores shipped and in gold bullion.....	1,019,175	21,068,216	1,089,339	22,518,635
Estimated exchange equalization on gold produced.....		18,170,022		19,420,917
Total Value—Canadian Funds.....		39,238,238		41,939,552
ONTARIO—				
*Porcupine Area—In gold bullion.....	1,425,711	29,472,061	1,439,149	29,749,849
*Kirkland Lake—In gold bullion (a).....	1,024,105	21,170,129	743,616	15,371,907
*Other gold mines—In gold bullion.....	721,007	14,904,537	933,318	19,293,395
Copper-Nickel and other ores.....	90,865	1,878,346	78,225	1,617,054
Total.....	3,261,688	67,425,073	3,194,308	66,032,205
Estimated exchange equalization on gold produced.....		58,149,915		56,948,653
Total Value—Canadian Funds.....		125,574,988		122,980,858
MANITOBA—				
In gold bullion, ores shipped and in blister copper.....	152,295	3,148,217	150,553	3,112,207
Estimated exchange equalization on gold produced.....		2,715,140		2,684,083
Total Value—Canadian Funds.....		5,863,357		5,796,290
SASKATCHEWAN—				
In ores shipped to Canadian smelters, crude placer gold and gold bullion.....	102,925	2,127,649	138,015	2,853,023
Estimated exchange equalization on gold produced.....		1,834,964		2,460,555
Total Value—Canadian Funds.....		3,962,613		5,313,578
ALBERTA—				
In alluvial gold.....	215	4,444	215	4,444
Estimated exchange equalization on gold produced.....		3,833		3,833
Total Value—Canadian Funds.....		8,277		8,277
BRITISH COLUMBIA—				
In alluvial gold.....	32,128	664,145	35,020	723,928
In gold bullion.....	348,239	7,198,739	351,974	7,275,948
In base bullion and in slag and ores exported.....	236,644	4,891,865	221,209	4,572,795
Total.....	617,011	12,754,749	608,203	12,572,671
Estimated exchange equalization on gold produced.....		11,000,175		10,843,145
Total Value—Canadian Funds.....		23,754,924		23,415,816
YUKON—				
In alluvial gold.....	79,905	1,651,783	70,847	1,464,537
In ores shipped.....	553	11,431	112	2,315
Total.....	80,458	1,663,214	70,959	1,466,852
Estimated exchange equalization on gold produced.....		1,434,419		1,265,070
Total Value—Canadian Funds.....		3,097,633		2,731,922
NORTHWEST TERRITORIES—				
In ores shipped.....	280	5,788	(b) 421	8,703
In gold bullion produced.....	54,879	1,134,450	73,996	1,529,633
Total.....	55,159	1,140,238	74,417	1,538,336
Estimated exchange equalization on gold produced.....		983,383		1,326,718
Total Value—Canadian Funds.....		2,123,621		2,865,054
Total for Canada.....	5,311,145	109,791,107	5,345,179	110,494,653
Total estimated exchange equalization on gold produced.....		94,687,976		95,294,739
Grand total value, including exchange.....		204,479,083		205,789,392

NOTE—The estimated average price of a troy ounce of fine gold in Canadian funds was \$38.50 in both 1940 and 1941.

* Includes relatively small amounts of gold contained in slags, and ore shipped.

(a) Includes production in Larder Lake area.

(b) Includes a relatively small amount of placer gold.

Table 42.—Production of Gold in Canada, by Principal Mines, 1941

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
NOVA SCOTIA						
Avon Gold Mines Ltd.	9,029		9,029	2,628	100	(a)
Consolidated Mining & Smelting Co. of Canada, Ltd.	11,846		11,846	(b)	40	(a)
Dickson, Aubrey	548	284	264	96	15	(a)
Forbes, R. G. (Country Harbour)	577	147	430	32	15	(a)
Guysborough Mines Ltd.	33,492	7,875	25,617	4,208	100	(a) (c)
Queens Mines Ltd.	3,207		3,207	1,201	13	(a)
Rehabilitation Project (15 Mile Stream)	(b)		359	161	15	(a)
Seal Harbour Gold Mines	(b)	(b)	(b)	(b)	(b)	
Victoria Gold Mines Ltd.	(b)	(b)	3,511	710	(b)	(a)
Other gold mines	(b)	(b)	(b)	10,134	(d) (b)	
Total—Nova Scotia				19,170	(e)	

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not recorded or available for publication.
 (c) Cyanidation.
 (d) Includes Consolidated Mining & Smelting Co. of Canada, Ltd. and Seal Harbour mine.
 (e) Receipts at Royal Canadian Mint, Ottawa.

QUEBEC						
Amm Gold Mines (Quebec) Ltd.	45,111		45,111	4,648	350	(c)
Arntfield Gold Mines Ltd.	658,500		658,500	73,472	1,800	(c) (e)
Beattie Gold Mines (Quebec) Ltd.	130,663	4,715	125,948	43,905	350	(c)
Belleterre Quebec Mines Ltd.	293,252		293,011	33,645	1,000	(c)
Canadian Malartic Gold Mines Ltd.	57,425	1,497	56,074	8,867	200	(c)
Central Cadillac Mines Ltd.	90,254	22,351	67,903	15,637	200	(c)
Cournoir Mining Co. Ltd.	537,828		537,828	73,863	1,800	(c)
East Malartic Mines Ltd.	76,316		76,316	13,554	250	(c)
Francoeur Gold Mines Ltd.	448,934		448,934	128,451	1,000	(c) (d)
Lamaque Mining Co. Ltd.	78,267		78,067	8,586	300	(a) (c)
Lapla Cadillac Gold Mines Ltd.	250,906	26,832	224,074	48,406	600	(c)
Malartic Gold Fields Ltd.	45,057	1,607	43,450	8,744	150	(c)
McWatters Gold Mines Ltd.	70,172		70,448	25,781	200	(a) (c) (e)
O'Brien Gold Mines Ltd.	59,991		59,991	8,669	150	(a) (c)
Pandora Cadillac Gold Mines Ltd.	234,408	83,250	151,158	49,654	360	(c)
Perron Gold Mines Ltd.	300	100	200	4	(b)	(a)
Pershing Manitou Gold Mines Ltd.	340,092		233,301	37,399	450	(c) (f)
Powell Rouyn Gold Mines Ltd.	(b)	(b)	284	4	45	(a)
Quebec Department of Mines	98,521		98,521	19,418	300	(c)
Senator-Rouyn Ltd.	383,355		383,355	76,956	1,100	(c)
Sigma Mines (Quebec) Ltd.	256,477	26,539	230,059	44,460	600	(a) (c)
Siscoe Gold Mines Ltd.	256,137		256,137	22,332	700	(c)
Sladen-Malartic Mines Ltd.	161,381		161,381	21,369	500	(c)
Stadacona Rouyn Mines, Ltd.	182,432	48,717	133,715	35,348	475	(a) (c)
Sullivan Consolidated Mines Ltd.	79,341	6,490	72,763	9,523	225	(c)
Wood Cadillac Mines Ltd.	(b)	(b)	(b)	9		
Other gold mines (placer)				276,635		
Copper-gold-silver ores						
Total—Quebec				1,089,339		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not available.
 (c) Cyanidation.
 (d) Also shipped tungsten concentrates.
 (e) Also shipped arsenic concentrates.
 (f) Production represents bullion recovered plus gold in ore shipped to smelter.

ONTARIO						
Porcupine District—						
Aunor Gold Mines Ltd.	159,341		159,341	43,052	300	(c)
Broulan Porcupine Mines Ltd.	158,181	19,293	138,888	27,695	350	(c)
Buffalo Ankerite Gold Mines Ltd.	448,621		448,621	71,654	1,300	(c)
Coniaurum Mines Ltd.	186,885		186,885	48,576	600	(c)
Delnite Mines Ltd.	167,296		166,596	30,702	500	(c)
De Santis Porcupine Mines Ltd.	64,673	4,337	60,405	10,655	160	(c)
Dome Mines Ltd.	627,700		627,700	201,472	1,700	(a) (c)
Paymar Porcupine Gold Mines Ltd.	58,262	2,636	55,626	8,598	250	(c)
Hallnor Mines Ltd.	132,515		132,267	65,585	400	(c)
Hollinger Consolidated Gold Mines Ltd. (Ross)	100,487		100,787	24,360	300	(c)
Hollinger Consolidated Gold Mines Ltd. (Timmins)	1,760,025		1,756,923	425,633	5,700	(c)

Table 42.—Production of Gold in Canada, by Principal Mines, 1941—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
ONTARIO—Continued						
Porcupine District— <i>Concluded</i>						
Hoyle Gold Mines Ltd.....	154,882	16,307	159,470	16,719	500	(a) (c) (f)
Mace Gold Mines Ltd.....			(g) 1,300	1,300		
McIntyre Porcupine Mines Ltd.....	874,035		865,670	238,118	2,500	(c)
Moneta Porcupine Mines Ltd.....	61,416		61,416	30,480	175	(c)
Naybob Gold Mines Ltd.....	54,030		53,807	13,783	200	(c)
Nakhodas Mining Co.....	23,782		23,782	3,696	(h)	(c)
Bonetal Gold Mines.....	11,663	591	6,805	1,053	(e)	(c)
Pamour Porcupine Mines Ltd.....	559,528		559,528	66,876	1,500	(c)
Paymaster Consolidated Mines Ltd.....	209,288	1,660	215,113	46,878	600	(c)
Preston East Dome Mines, Ltd.....	221,926	27,109	194,817	62,256	500	(a) (c) (i)
Kirkland Lake District—						
Bidgood Kirkland Gold Mines, Ltd.....	40,337		40,460	12,101	125	(c)
Golden Gate Mining Co. Ltd.....	23,781		23,781	5,558	100	(a) (c)
Kirkland Lake Gold Mining Co. Ltd.....	136,613		136,613	48,767	400	(c)
Lake Shore Mines Ltd.....	530,368		530,368	205,334	2,300	(c) (j)
Macassa Mines Ltd.....	142,712		142,332	65,375	400	(c)
Morris Kirkland Gold Mines Ltd.....	25,700		25,645	3,111	100	(c) (k)
Sylvanite Gold Mines Ltd.....	197,850		197,293	67,160	600	(c)
Teck-Hughes Gold Mines Ltd.....	258,100		258,100	65,714	1,000	(c)
Toburn Gold Mines Ltd.....	67,661	6,946	60,715	28,422	150	(c)
Upper Canada Mines Ltd.....	73,414		73,414	32,553	225	(c)
Wright-Hargreaves Mines Ltd.....	411,760		411,760	208,937	1,250	(c)
Larder Lake District—						
Chesterville Larder Lake Gold Mines Ltd.....	252,056		252,056	36,444	700	(c)
Kerr-Addison Gold Mines Ltd.....	694,783		694,894	146,072	2,000	(c)
Omega Gold Mines Ltd.....	173,688		173,688	22,664	500	(c)
Yama Gold Mines Ltd.....	5,336	1,883	3,583	586	50	(c)
Matachewan District—						
Hollinger Consolidated Gold Mines, Ltd. (Young-Davidson).....	346,765		346,715	35,634	1,050	(c)
Matachewan Consolidated Mines Ltd.....	196,962		196,962	23,049	500	(c)
Tyrant Mines Ltd.....	76,800		76,800	11,187	200	(c)
Sudbury District—						
Consolidated Mining & Smelting Co. of Canada, Ltd. (Golden Rose).....	11,978		12,495	3,440	100	(c) (l)
Jerome Gold Mines Ltd.....	60,215		58,824	8,757	500	(c) (m)
Algoma District—						
Cline Lake Gold Mines Ltd.....	85,163		85,313	10,730	250	(c)
Regenery Metals.....	2,430		4,109	830	23	(a) (n)
Thunder Bay District—						
Bankfield Cons. Mines Ltd.....	38,426		39,175	6,186	130	(a) (c)
Hard Rock Gold Mines Ltd.....	192,660	57,283	135,337	30,504	450	(c) (p)
Jellicoe Mines Ltd.....			1,591	518		(q)
Leitch Gold Mines Ltd.....	(b)	7,284	30,493	23,228	75	(a) (c)
Little Long Lac Gold Mines Ltd.....	133,355	15,023	118,332	42,427	300	(a) (c)
Magnet Cons. Mines Ltd.....	47,731	2,182	45,609	25,345	175	(a) (c)
McLeod-Cockshutt Gold Mines Ltd.....	338,391	101,315	237,076	60,362	650	(c)
Northern Empire Mines Co. Ltd.....	37,306	2,449	39,015	10,890	180	(c) (r)
St. Anthony Gold Mines Ltd.....	85,909	14,136	70,640	7,870	125	(c)
Sand River Gold Mining Co. Ltd.....	27,895	6,843	21,052	7,195	75	(c) (s)
Sand River Gold Mining Co. Ltd.....	14,806	4,034	10,772	2,751	75	(c) (t)
Sturgeon River Gold Mines Ltd.....	40,816	14,947	25,869	11,887	75	(a) (c)
Tombill Gold Mines Ltd.....	46,956		46,956	13,315	125	(a) (c)
Kenora and Rainy River Areas—						
Goldwood mine Ltd. (J. D. Shannon)...	9,659	1,549	8,110	2,696	75	(a)
Orelia Mines Ltd.....	29		28	27	10	(a) (u)
Sandybeach Lake Synd.....	(b)	(b)	125	10	(b)	(v)
Straw Lake Beach Gold Mines Ltd.....	8,596	961	6,759	3,106	60	(a)
Upper Seine Gold Mines Ltd.....	1,880		1,880	163	50	(a) (w)
Wendigo Gold Mines Ltd.....	46,392	10,107	36,285	12,021	80	(a)
Patricia District—						
Berens River Mines Ltd.....	(b)		86,373	27,837	24	(x)
Central Patricia Gold Mines Ltd.....	142,650	134	142,516	50,618	200	(c)
Cochenour Willans Gold Mines Ltd.....	61,415		61,415	24,546	250	(a) (c) (y)
Gold Eagle Gold Mines Ltd.....	46,552	8,357	38,195	7,449	125	(c)
Hasaga Gold Mines Ltd.....	163,088	28,272	134,816	25,888	350	(c)
Howey Gold Mines Ltd.....	481,746	96,137	385,609	22,005	1,250	(c)
Jason Mines Ltd.....	55,734	7,372	48,362	19,951	125	(c)
Madsen Red Lake Gold Mines Ltd.....	147,150	1,100	145,995	31,189	400	(a) (c)
McKenzie Red Lake Gold Mines Ltd.....	103,800	19,654	84,146	25,933	250	(c)
McMarnac Red Lake Gold Mines Ltd.....	29,794		15,223	75	75	(b) (z)
Pickle Crow Gold Mines Ltd.....	175,284	29,294	146,375	70,990	400	(a) (c)
Sachigo River Exploration Co. Ltd.....	31,145	14,587	16,603	14,144	25	(a) (c)
Uchi Gold Mines Ltd.....	279,304	29,806	249,417	36,954	750	(a) (c)

Table 42.—Production of Gold in Canada, by Principal Mines, 1941—Continued

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
ONTARIO—Concluded						
Eastern Ontario—						
Mayboro Milling Co. Ltd.....	300		300	60	18	(a) (*)
Other gold mines.....						
Nickel-copper ores (including lead and cobalt ores).....				76,556		
Total—Ontario.....				3,194,308		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not recorded.
 (c) Cyanidation.
 (d) Testing.
 (e) Milled by Broulan Porcupine Mines Ltd.
 (f) Milling commenced February 1.
 (g) Cleanup only.
 (h) Milled by Faymar Porcupine Mines.
 (i) Also shipped tungsten concentrates.
 (j) In addition treated 407,823 tons of tailings.
 (k) Operations ceased November 15.
 (l) Operations ceased September 30.
 (m) Milling commenced August 26.
 (n) In addition 54.6 tons of concentrates stored assaying 4.6 ounces per ton.
 (p) In addition 588 tons of tailings retreated.
 (q) Milled at Magnet Cons. Mines Ltd.
 (r) Milling ceased September 4.
 (s) Period January 1 to August 31.
 (t) Operated by Northern Empire Mines September 1 to December 31.
 (u) Milling June 5 to June 23.
 (v) Milled in Van Houten Gold Mines' mill.
 (w) Milling ceased September 24.
 (x) In ore and concentrates shipped to smelter and in addition 703 tons concentrates stored containing 126 ounces gold; shipments also included 1,194,730 ounces silver and 1,042,006 pounds lead.
 (y) In addition 305 tons concentrates stored assaying 3.275 ounces per ton.
 (z) In addition 48.58 tons of concentrates were stored assaying 5.67 ounces gold per ton; other concentrates shipped to smelter.
 (*) In addition 6 tons concentrates stored assaying 1.5 ounces gold per ton.

MANITOBA						
Black Hawk (W. J. Richards).....	200		58	119		(e)
Century Mining Corp. Ltd.....	358		1,076	48	100	(a) (d)
God's Lake Gold Mines Ltd.....	72,903		72,903	21,922	200	(a) (c)
Gunnar Gold Mines Ltd.....	54,320	3,584	50,736	14,869	140	(c)
San Antonio Gold Mines Ltd.....	138,097		137,415	43,121	550	(a) (c)
Other gold mines.....	(b)	(b)	(b)	251	(b)	
Copper-gold-silver ores.....				70,223		
Total—Manitoba.....				150,553		

FOOTNOTES—

- (a) Amalgamation.
 (b) Data not available.
 (c) Cyanidation.
 (d) Milling commenced August 15.
 (e) Crude ore shipped to smelter.

SASKATCHEWAN						
Consolidated Mining & Smelting Co. of Canada Limited (Box).....	494,186		494,986	(b)	1,355	(e)
Pamour Gold Mines Ltd. (MacDonald & Co.).....	2,497		2,497	2,750		(d)
Other lode gold mines.....	(b)	(b)	(b)	21,692	(e)	
Alluvial deposits.....	(b)	(b)	(b)	57		
Copper-gold-silver ores.....				113,516		
Total—Saskatchewan.....				138,015		

FOOTNOTES—

- (b) Data not recorded or available for publication.
 (c) Cyanidation.
 (d) Crude ore shipped to smelter.
 (e) Includes Box mine.

ALBERTA						
Placer gold.....	(x)	(x)	(x)	215		

(x) No record.

Table 42.—Production of Gold in Canada, by Principal Mines, 1941—Concluded

Property and Province	Ore raised	Material sorted (discarded)	Ore treated	Gold production	Mill capacity 24 hours	See footnotes
	Tons	Tons	Tons	Fine oz.	Tons	
BRITISH COLUMBIA						
Bayonne Cons. Mines Ltd.	20,224		20,224	8,274	50	(c)
Bralorne Mines Ltd.	(b)		191,970	101,063	500	(a) (d)
Buccaneer Mines Ltd.	(b)	400	1,947	517	25	(a) (e)
Buena Vista Mining Co. Ltd.	190,436		190,436	12,239	500	(c)
Cariboo Gold Quartz Mining Co. Ltd.	129,256		129,256	48,527	350	(c)
Cons. Nicola Goldfields Ltd.	2,375	475	4,275	141	100	(d)
Gold Belt Mining Co. Ltd.	56,502		56,502	15,811	150	(c)
Hedley Mascot Gold Mines Ltd.	66,352		68,155	21,830	175	(c) (d)
Homeward Mines Ltd.	(b)	(b)	1,511	897	50	(a) (d) (f)
Island Mountain Mines Co. Ltd.	54,398		54,398	24,756	150	(c)
Kelowna Exploration Co. Ltd.	97,468		97,476	33,881	275	(c) (d)
Kootenay Belle Gold Mines Ltd.	34,644		34,644	9,684	150	(c)
Livingston Mining Co.	1,679		1,679	1,208	30	(d)
Mount Zeballos Gold Mines Ltd.	31,658	10,397	21,261	9,744	60	(a) (d)
Pioneer Gold Mines of B.C. Ltd.	92,456	16,018	109,311	53,645	350	(a) (c)
Polaris-Taku Mining Co. Ltd.	89,685		89,610	19,091	300	(d) (g)
Prident Gold Mines Ltd.	3,799		3,634	3,803		(h)
Privateer Mines Ltd.	(b)	24,299	31,354	24,328	90	(a) (c)
Relief Arlington Mines Ltd.	27,697	13,001	14,310	5,306	75	(c) (i)
Reno Gold Mines (Nelson)	15,074		13,595	6,706	120	(c) (d)
Reno Gold Mines (Central Zeballos)	20,119	5,797	14,322	6,568	45	(a) (d)
Sheep Creek Gold Mines Ltd.	55,052		55,052	26,083	150	(c)
Silbak Premier Mines Ltd.	170,504		170,504	39,044	500	(d)
Spud Valley Gold Mines Ltd.	72,943	38,394	34,549	14,031	103	(a) (d) (j)
Surf Inlet Cons. Gold Mines Ltd.	43,258	3,948	39,310	13,161	120	(d)
Vancouver Island Drilling & Exploration Co. Ltd.	855		855	333		(d)
Velvet Gold Leasers	(b)	1,000	8,432	1,515	100	(d)
White Star Mine Ltd.	(b)		400	1,531		(d)
Ymir Yankee Girl Gold Mines Ltd.	32,719		32,809	6,444	100	(d) (k)
Placer gold			(l) 4,587,103	35,020		
Copper gold ores				35,010		
Silver Lead and other gold mines				28,012		
Total—British Columbia				608,203		

FOOTNOTES—

- (a) Amalgamation.
 (b) Not recorded.
 (c) Cyanidation.
 (d) Ore or concentrates shipped to smelter.
 (e) In addition 12 tons concentrates stored assaying 6.14 ounces per ton; milling commenced September 1.
 (f) Milling commenced in June.
 (g) Concentrates on hand December 31, 3,742 tons, assaying 3.3 ounces gold per ton.
 (h) Treated in Privateer mill.
 (i) Milling ceased June 28.
 (j) In addition 57 tons concentrates stored assaying 3.87 ounces per ton.
 (k) In addition 16,118 tons tailings restreated.
 (l) Partly estimated—cubic yards handled.

YUKON						
Placers			(l) 8,792,220	70,847		
Silver-lead ores	(x)			112		(b)
Total—Yukon				70,959		

FOOTNOTES—

- (x) No record.
 (b) In concentrates exported.
 (l) Cubic yards handled, partly estimated.

NORTHWEST TERRITORIES						
Consolidated Mining and Smelting Co. of Canada, Limited (Con)	47,223		47,223	(x)	175	(a) (c)
Consolidated Mining and Smelting Co. of Canada, Limited—Rycon Mine	12,597		12,597	(x)		(d)
Negus Mines Ltd.	(x)	4,349	22,310	18,349	60	(a) (c)
Pitarmigan Mines Ltd.	11,696		3,096	(x)	100	(a) (c) (e)
Thompson-Lundmark Gold Mines Ltd.	19,447		11,915	(x)	125	(a) (e) (f)
Slave Lake Gold Mines Ltd.	(x)	764	13,057	5,816	50	(a) (b)
Other gold mines				50,252	(g)	
Silver ores						
Total—Northwest Territories				74,417		
Grand Total—Canada				5,345,179		

FOOTNOTES—

- (x) Not recorded or available for publication.
 (a) Amalgamation.
 (b) In ores smelted and refined.
 (c) Cyanidation.
 (d) Treated in Con mill.
 (e) Milling commenced November 27.
 (f) Milling commenced August 19.
 (g) Includes production of all mines marked (x).

Table 43.—Source of Canadian Gold Production, 1932-1941

Year	In alluvial gold	In crude gold bullion produced at mines (a)	In base bullion produced at lead smelters	In blister copper produced (†)	In Ores, matte, slags, etc., exported	Total gold produced
	%	%	%	%	%	Fine oz.
1932.....	1.8	79.3	1.0	15.1	2.8	3,044,387
1933.....	2.0	79.8	0.7	14.2	3.3	2,949,309
1934.....	2.0	78.7	1.1	13.4	4.8	2,972,074
1935.....	1.8	78.3	2.2	13.2	3.9	3,284,890
1936.....	2.2	77.4	1.6	13.8	5.0	3,748,028
1937.....	2.2	80.2	0.9	11.7	5.0	4,096,213
1938.....	2.5	80.8	0.9	11.2	4.5	4,725,117
1939.....	2.5	82.1	0.6	10.4	4.4	5,094,379
1940.....	2.1	82.7	0.6	10.0	4.6	5,311,145
1941.....	2.0	82.6	0.4	10.3	4.7	5,345,179

(a) Includes a relatively small quantity of gold contained in interprovincial shipments of gold ores, slags, etc., to Canadian smelters.

(†) Some blister copper is refined in the United States; also contains a relatively small quantity of gold recovered from auriferous quartz ores.

Table 44.—Production of Gold in Canada, 1929-1941

Year	Fine ounces	Value*	Value in Canadian funds	Year	Fine ounces	Value*	Value in Canadian funds
		\$				\$	\$
1929.....	1,928,308	39,861,663		1936.....	3,748,028	77,478,612	131,293,421
1930.....	2,102,068	43,453,601		1937.....	4,096,213	84,676,235	143,320,493
1931.....	2,693,892	55,687,688	58,093,396	1938.....	4,725,117	97,676,834	166,205,990
1932.....	3,044,387	62,933,063	71,479,373	1939.....	5,094,379	105,310,157	184,115,951
1933.....	2,949,309	60,967,626	84,350,237	1940.....	5,311,145	109,791,107	204,479,083
1934.....	2,972,074	61,438,220	102,536,553	1941.....	5,345,179	110,494,653	205,789,392
1935.....	3,284,890	67,904,700	115,595,279				

NOTE.—For years 1858 to 1928, see 1937 and 1938 reports.

*Calculated from the value \$1=0.048375 ounces.

Table 45.—Estimated Average Monthly Value of an Ounce of Fine Gold, Expressed in Canadian Funds, 1931 and 1938-1941

Month	1931	1938	1939†
	\$	\$	\$
January.....	20.71	34.99	35.30
February.....	20.67	35.00	35.19
March.....	20.67	35.05	35.13
April.....	20.68	35.15	35.15
May.....	20.68	35.22	35.13
June.....	20.73	35.36	35.07
July.....	20.74	35.24	35.06
August.....	20.73	35.12	35.01
September.....	21.55	35.12	37.21
October.....	23.22	35.32	38.43
November.....	23.22	35.25	38.50
December.....	25.01	35.28	38.50
Yearly average.....	21.55	35.17	36.14

NOTE.—At December 29th, 1941, the price paid by the United States Treasury for gold purchased by the Mint continued at \$35 per troy ounce of fine gold, less $\frac{1}{2}$ of 1 per cent. Actual payment by the United States Treasury for gold in imported and domestic ore or concentrate was at 99.75 per cent of the price quoted by the Treasury, which, at the close of 1941 was equal to \$34.9125 per ounce.

For data 1932-1937, see Annual Report for 1937.

†The price of gold in Canadian funds remained constant at \$38.50 during the entire years of 1940 and 1941.

Table 46.—Precious Metals Consumed by the Jewellery and Silverware Industry in Canada, 1941 and 1940

Materials	Cost at works	
	1941	1940
	\$	\$
Precious metals—		
Fine gold.....	2,343,880	1,595,699
Gold alloys.....	392,067	230,108
Fine silver.....	1,144,409	660,650
Silver alloys.....	646,528	765,067
Platinum.....	208,318	148,748
Old gold, jewellers' findings, waste and scrap for refining.....	1,308,882	1,064,156
Gold-filled wire and stock.....	510,646	213,534
Precious and semi-precious stones.....	732,748	761,410

GOLD EXPORTS

(Order in Council P.C. 9131—November 26, 1941)

WHEREAS by Order in Council, P.C. 1150, dated May 17, 1932, regulations respecting the export of gold, whether in the form of coin or bullion, from the Dominion of Canada, were made under the authority of The Gold Export Act;

AND WHEREAS the said regulations were by Order in Council, P.C. 7246, dated December 11, 1940, continued in force until December 31, 1941;

AND WHEREAS in the opinion of the Minister of Finance it is expedient that the said regulations be continued in force beyond December 31, 1941;

NOW, THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of Finance and under the provisions of the said "The Gold Export Act," is pleased to order that the provisions of the said Regulations be and they are hereby continued in force and effect until December 31, 1942, unless sooner rescinded by Order in Council.

NOTE:—Order in Council P.C. 1150, reads, in part, as follows—"The export of gold, whether in the form of coin or bullion (including ore, etc.) from the Dominion of Canada, is hereby prohibited, except in such cases as may be deemed advisable by the Minister of Finance, and under license to be issued by him."

GOLD IN CANADIAN EXPORT TRADE

Exports of gold in Canadian trade statistics were distinguished in previous reports as between monetary and non-monetary. Monetary gold exports were described as those which entailed a reduction in the Dominion's monetary gold stocks. All other gold exported (classed as non-monetary) were shown as merchandise, and included with the total merchandise exports.

The fact that gold is a money metal gives it peculiar attributes which distinguish it from other commodities in trade. In particular, the movement of gold in international trade is determined almost exclusively by monetary factors. The amount of exports may fluctuate widely from month to month owing to other than ordinary trade or commercial considerations. In addition, gold is generally acceptable. It does not have to surmount tariff barriers and is normally assured a market at a relatively fixed price. For these reasons provision was made in previous trade reports for a supplementary table showing exports from Canada excluding all gold.

It is further to be noted gold does not move in international trade in any direct or normal relation to sales and purchases. It may be bought or sold abroad without moving in or out across the frontier, the sales or purchases in such cases being recognized by simply setting aside or "earmarking" the gold in the vaults of the central bank. Trade statistics deal only with physical movements, sales or purchases of gold which do not involve an actual movement being more properly regarded as an "invisible item" and taken care of in the "International Balance of Payments" statements. Changes in the Bank of Canada's stock of gold under earmark do not enter, therefore, into the trade statistics.

The publication of statistics showing the *gross* imports and exports of gold has been temporarily suspended as from September, 1939. Statistics for periods prior to this time have been accordingly revised to exclude all gold formerly included in the total of merchandise exports.

Statistics showing the *net* exports of non-monetary gold, including changes in stocks held under earmark, are published as a supplement to the trade figures, and are given in the following table.

Table 47.—Net Exports of Non-Monetary Gold

	1937	1938	1939	1940	1941	1942
	\$	\$	\$	\$	\$	\$
January.....	10.1	11.0	18.1	21.6	19.2	15.1
February.....	10.8	11.2	12.9	12.4	14.7	16.6
March.....	16.3	17.6	15.5	16.2	19.7	.....
April.....	10.3	9.3	10.6	18.0	14.3	.....
May.....	10.3	14.3	15.9	16.9	16.1	.....
June.....	13.5	11.5	17.2	15.1	18.4	.....
July.....	10.1	11.5	15.2	15.9	17.3	.....
August.....	12.3	16.6	9.0	17.6	12.6	.....
September.....	11.6	15.1	17.3	16.5	21.2	.....
October.....	11.3	15.5	22.8	18.9	17.4	.....
November.....	12.1	15.3	15.0	16.6	15.4	.....
December.....	16.4	11.6	14.9	17.3	17.4	.....
12 Months December.....	145.1	160.5	184.4	203.0	203.7	31.7

CANADIAN GOLD METAL STOCKS

Data relating to stocks of Canadian gold in 1940 and 1941 were not published. For information pertaining to these stocks prior to 1940, see previous annual gold mining reports as issued by the Bureau of Statistics.

Table 48.—World's Monetary Stocks of Gold at the Close of 1938, 1939 and 1940 (Subject to Revision).

(Compiled by the United States Mint from available data)
(Stated in United States money)

Country	Total Gold Stock Value, 1938 (e)	Per capita	Total Gold Stock Value, 1939 (e)	Per capita	Total Gold Stock Value, 1940 (e)	Per capita
	\$	\$	\$	\$	\$	\$
United States (d).....	14,511,124,000	111.04	17,643,577,000	133.17	21,991,102,000	165.98
Canada.....	193,088,000	17.23	209,223,000	18.55	7,251,000	0.63
Argentina.....	431,561,000	33.30	466,000,000	36.51	438,075,000	34.33
Belgium.....	728,104,000	86.82	607,140,000	72.85	736,000,000	88.03
Denmark.....	53,366,000	14.07	53,083,000	14.10	52,003,000	13.82
France.....	2,430,376,000	57.89	2,708,878,000	64.64	2,000,068,000	47.73
Germany.....	28,543,000	0.36	40,118,000	0.59	40,280,000	0.60
Great Britain.....	2,696,043,000	56.78	10,314,000	0.22	1,991,000	0.04
Italy.....	192,885,000	4.43	144,000,000	3.29	137,000,000	3.13
Netherlands.....	994,525,000	113.96	690,128,000	79.92	617,299,000	71.49
Norway.....	93,598,000	32.04	93,916,000	32.31	84,388,000	29.03
Poland.....	94,541,000	2.41	85,000,000	2.46	.....	.....
Portugal.....	68,758,000	9.22	68,900,000	9.47	92,284,000	12.89
Roumania.....	132,791,000	6.69	151,606,000	7.72	157,400,000	8.01
Russia (Soviet Union).....	(a)	(a)	(a)	(a)	(a)	(a)
Spain.....	525,000,000	21.00	525,000,000	21.13	(a)	(a)
Sweden.....	321,119,000	50.89	308,117,000	49.02	304,955,000	48.52
Switzerland.....	699,095,000	166.06	548,580,000	131.43	502,115,000	120.29
British India.....	274,578,000	0.76	274,472,000	0.81	274,480,000	0.81
Japan (including Chosen, Taiwan, Kwantung).....	163,476,000	1.59	163,570,000	1.61	163,570,000	1.61
Netherlands East Indies.....	79,552,000	1.18	89,930,000	1.40	139,659,000	2.17
Egypt.....	52,229,000	3.26	52,500,000	3.30	52,000,000	3.10
Australia.....	3,435,000	0.50	4,200,000	0.61	16,683,000	2.43
New Zealand.....	23,086,000	14.39	23,086,000	12.04	23,087,000	14.41
Union of South Africa.....	229,357,000	23.19	250,451,000	2.13	352,713,000	36.00
Other countries.....	746,510,000	.....	724,292,000	.....	902,251,000	.....
Total.....	25,757,240,000	(b) 12.46	25,933,081,000	(b) 12.71	29,086,657,000	(b) 14.28

(a) Data omitted because of indefiniteness or unavailability.

(b) Population figures are principally supplied by United States Department of Commerce, 1938-40.

(d) Includes Alaska, Hawaii and Puerto Rico.

(e) 1 ounce fine gold=\$35.

NOTE.—It is understood that material amounts of gold are not reported by several countries, such as, amounts held in secret funds for stabilizing currencies and those hoarded or held outside of regularly reported stocks.

ORDER IN COUNCIL P.C. 1397—FEBRUARY 23, 1942

WHEREAS subsection one of section twenty-five of the Bank of Canada Act, Chapter forty-three of the Statutes of Canada, 1934, provides that the Bank shall sell gold to any person who makes demand therefor at the head office of the Bank and tenders the purchase price in legal tender, but only in the form of bars containing approximately four hundred ounces of fine gold;

AND WHEREAS by Order in Council P.C. 1621 dated March 6, 1941, passed under the provisions of subsection two of said section twenty-five of the said Act, the operation of said subsection one of section twenty-five was suspended for a period of one year from and after March 10, 1941.

NOW, THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of Finance and under the provisions of said subsection two of section twenty-five of the Bank of Canada Act is pleased to order that the operation of said subsection one of section twenty-five be and it is hereby suspended for a further period of one year from and after the tenth day of March, 1942, unless sooner rescinded by Order in Council.

ROYAL CANADIAN MINT

There were 1,978 rough gold deposits received at Vancouver and 7,141 deposits at Ottawa in 1941. Details relating to the origin of these deposits are shown in the following statement:

Table 49.—

Source	Gross Weight	Fine Gold	Fine Silver
	Oz.	Oz.	Oz.
From Canadian Mines.....	6,419,500-230	5,080,004-223	743,498-65
Jewellery and Scrap.....	27,038-535	12,227-477	3,433-51
Foreign Gold Coin.....	963-300	908-709	.....
Mutilated Gold Coin.....	5-150	4-640	.....
	6,447,507-215	5,093,145-045	746,932-16
From Mines in—			
Ontario.....	3,976,329-150	3,165,508-723	432,040-00
Quebec.....	1,529,243-000	1,242,037-652	154,626-55
British Columbia.....	569,040-160	408,932-765	108,543-29
Manitoba.....	109,824-225	79,766-876	11,307-80
Yukon.....	88,940-750	71,397-192	14,204-82
Nova Scotia.....	21,180-575	19,169-727	671-62
North West Territories.....	97,829-500	74,028-734	15,659-69
Alberta and Saskatchewan.....	27,112-870	18,162-554	6,444-88
	6,419,500-230	5,080,004-223	743,498-65

There were issued to the Bank of Canada 12,720 trade bars containing 5,077,230.825 ounces fine gold, which had been refined and cast in the Mint Refinery from the rough gold deposits received from the various sources mentioned.

THE ALLUVIAL GOLD MINING INDUSTRY IN CANADA

In 1941, and for many years past, the greater part of the Canadian production of alluvial gold came from the Yukon Territory and British Columbia; relatively small quantities are also obtained in Alberta, Saskatchewan and Quebec.

It was estimated that 132,552 ounces of crude gold were recovered from Canadian alluvial deposits in 1941. Of this production, 65 ounces came from Saskatchewan, 220 ounces from Alberta, 43,775 ounces from British Columbia, 88,488 ounces from Yukon and 54 ounces from Northwest Territories. In addition to crude gold recovered, there were 60 ounces of platinum obtained in 1941 from alluvial deposits in British Columbia.

Quebec.—During the year under review, the Appalachian Mining Syndicate operated in June and completed 163 feet of trenching between Lat. 8 and 7, Range 7, southwest Stratford township, Wolfe County. In Compton County, Wm. A. Davis recovered approximately four ounces of crude placer gold from workings on Lat. 11, Range 5, Westbury township, and on Big Hollow Brook in the same township, test drilling was conducted during May and June by R. E. Frasier. No other official reports of placer mining in 1941 were received from Quebec operators.

Ontario.—Some development of placer claims in the Capreol district has been recorded during past years but no work of this nature was reported in 1941.

Saskatchewan and Alberta.—Placer gold has been mined along the North Saskatchewan River at various points between Rocky Mountain House, Alberta, and Prince Albert, Saskatchewan, from about 1860. Most activity has, however, been confined to the Alberta region, particularly in the vicinity of Edmonton.

The returns of gold from the river for a period of thirty-two years, from 1887 to 1918, are given by the Department of Mines as 15,036 fine ounces valued at \$310,814. These figures were compiled by the Department from reports of local bank managers as a basis. In 1887 the first dredge was built on the river and from that time dredges have worked with varying success, though most of the gold has been obtained by miners working with shovel and grizzly collecting the gold on blankets, after which the blankets are washed and the gold separated from the tailings by means of mercury.

The gold is irregularly distributed in the gravels of the river and under bench gravels and is recovered when conditions are convenient to work such bars which move from point to point according to the vagaries of the stream. No individual reports are received from prospectors and production as credited to placer mining is obtained from Government mint statements which show total recoveries of fine gold in 1941 of 57 ounces from Saskatchewan deposits and 215 ounces from Alberta.

Northwest Territories.—No production of placer gold in the Territories was reported direct by miners in 1941; however, Liard-Nahanni Gold Placers Ltd. carried on prospecting in the Flat River area from June to December 26. Relatively small quantities of gold received at the Vancouver Assay Office from the Northwest Territories represent metal obtained from alluvial deposits; particulars relating to these recoveries, totalling 39 fine ounces in 1941, are not available.

British Columbia.—It has been found impractical to obtain complete reports for each individual placer gold mining operation in British Columbia inasmuch as a considerable quantity of the crude placer gold is recovered annually by prospectors of no fixed abode who, in many instances, market their recoveries through local merchants and banks.

Recoveries in 1941 were made chiefly from deposits located in the Atlin, Quesnel, Cariboo and Omineca districts; production was also reported from the New Westminster, Cassiar, Greenwood, Similkameen, Fort Steele, Vernon, Kamloops, Stikine, Clinton, Nelson, Nanaimo and Revelstoke districts.

In 1941 official returns were made to the Dominion Bureau of Statistics by approximately 98 operators who reported 393 employees and the distribution of \$625,173 in salaries and wages. Consumption of fuel and process supplied amounted to \$101,411. The value of crude gold production was \$1,352,648 compared with \$1,191,543 in 1940. The quantity of sands and gravels, including overburden, moved during the year under review was estimated at 4,587,103 cubic yards; equipment employed in mining operations included hydraulic jets (monitors-giants), gasoline shovels, drag lines, steam shovels, tractors and dredges. Material worked included bench gravels, river gravels, pre-glacial deposits and tailings. Work was conducted both on the surface and underground.

Bulletin No. 15, "Hydraulic Mining Methods"—issued by the British Columbia Department of Mines, states: "When placer gold was first discovered in British Columbia much of the gravel was mined by methods other than hydraulicicking. Subsequently, however, with the working out of rich shallow gravel, extensive yardages of lower grade gravels were left which, under favourable conditions, were mined by hydraulicicking. This type of mining produces the largest proportion of placer gold at present. . . . All the rich ground that is known has been, or is being worked. In the past, failure to sample and properly estimate the available yardage of placer deposits has resulted in a tremendous waste of money and effort. . . . A placer deposit may be sampled by any one or a combination of methods; by panning gravel from natural exposures, by drifting, by test-pitting, by shaft sinking, or by Keystone-drilling. In every instance, in order to get reliable results, the work should be done carefully and systematically so that the information may be compiled to give as complete a picture of the deposit as it is possible or economical to obtain."

Yukon.—The following is from the Annual Report of G. A. Jeckell, Controller of Yukon Territory, for the fiscal year ending March 31, 1942.

"The amount of placer gold mined during the year in the Territory on which royalty export tax was paid was 87,442.60 ounces, produced as follows: Dawson District, 83,959.48 ounces; Mayo District, 2,550.75 ounces; and Whitehorse District, 932.37 ounces. The royalty collected was \$32,791.28. The gold production was 10,696.01 ounces less than for the previous year.

"In the Dawson District, fifty-two new placer location grants; forty-six relocation grants, and two thousand three hundred and thirty-two renewal grants were issued, representing two thousand four hundred and thirty claims in good standing. Three dredging leases were renewed covering twenty-three miles, and fees for renewal of four hydraulic leases were paid.

"In the Mayo District, thirty-one new placer location grants, ten relocation grants, and ninety-six renewal grants were issued, making one hundred and thirty-seven placer claims in good standing.

"In the Whitehorse District, fifteen new placer location grants were issued, one relocation grant, and thirty-seven renewal grants, making forty-nine claims in good standing.

"The total number of placer claims in good standing from the whole Territory was two thousand six hundred and sixteen.

"The Yukon Consolidated Gold Corporation Limited reported as follows: The company's hydro-electric power plant on the north fork of the Klondike River operated continuously during the year and a total of 32,989,200 kilowatt hours was generated, of which 88% was used by the company in connection with its mining operations and the balance sold to the Dawson City utility companies. Hydraulic muck stripping operations were continued during the summer season at eight large plants previously operated. Hydraulic gravel levelling on Lower Bonanza Creek was also continued. All plants were more or less seriously affected by water shortage during the summer. A total of \$197,830 was expended on stripping operations, an average of 7.35 cents per cubic yard stripped. Cold water thawing operations were continued at seven plants formerly operated and two new plants were started. A total of \$311,740.00 was expended on thawing operations during the year, an average of 4.38 cents per cubic yard and, in addition, \$25,620.00 was spent on thaw-drilling at Number 3 plant. Nine dredges were operated for the entire season and a tenth dredge, Number 4, was started on September 18 after completion of reconstruction. The first dredging commenced April 22 and operations ceased November 29. Cubic yards dredged totalled 8,205,270. Total gold production for the year from dredges was \$2,333,681.00, representing an average recovery of 28.43 cents per cubic yard dredged, at \$38.50 Canadian; 60,526.827 fine ounces of gold and 4,623.77 fine ounces of silver were produced. A total of \$1,163,000.00 was expended for salaries, wages and board and \$49,000 on prospect drilling; practically all roads in the district were open for automotive traffic during the entire winter of 1940-41, which is unusual, and until late in the fall of 1941.

"The Holbrook Dredging Company, in receivership, operated a dredge on the upper Sixty-mile River commencing on April 30 and closing down on November 4, 1941, producing 3,021.86 ounces, having a recovery value of \$88,839.00; the yardage dredged was approximately 290,000 cubic yards.

"Another mining operation was started in the Sixtymile District during the year—the Idaho Canadian Company—acquired ground on Glacier Creek, Big Creek and Sixtymile Creek; construction of a dredge by this company was postponed owing to the fact that the operations could not obtain a Diesel engine. Clear Creek Placers Limited, formerly known as Canadian Placers Limited, continued their operations; during the period 119,600 cubic yards of gravel was sluiced and \$77,470.60 was produced; 118,923 yards of muck was stripped from gravels to be mined in 1942. The Canadian Tungsten Limited acquired nine placer claims and two prospecting leases of three miles on Canadian Creek and its tributaries; a drag line and a caterpillar with hydraulic blade were operated; from August 10 to September 15 a total of 2,800 cubic yards of gravel was treated, and this resulted in a recovery in gold of an average of \$1.56 per yard in addition to the Ferberite recovery. Yukon Alluvial Golds Limited, an associate company to Clear Creek Placers Limited, completed drilling on Britannia Creek and Selwyn Creek. Messrs. Stewart and Campbell on Miller Creek confined their operations to early spring hydraulic work and

drilling to bench ground on hydraulic lease No. 46. On Ballarat and Kirkman Creeks, E. P. Crawford prospected by shafts; on Last Chance Creek, Messrs. Bremner and Franich installed a diesel operated pump using water from the creek to hydraulic hill gravels.

"In the Mayo District, the most important placer operations were those of the Haggart Creek Company on Haggart Creek, Fred Taylor on Dublin Gulch and E. Middlecoff on Hight Creek; approximately 70,000 cubic yards of bench gravel and stream gravel was moved by the Haggart Creek Mining Company and 1,968.07 ounces of gold recovered. On Dublin Gulch, Fred Taylor made a very satisfactory recovery of gold and in addition shipped 1,764 pounds of *scheelite* concentrates to the Mines Branch, Ottawa. Other mining operations in the Mayo district were conducted on Duncan and Lightning Creeks, and on creeks flowing into Mayo Lake.

"In Whitehorse District, less gold was produced than in previous years, and no new operations were started.

"The summer of 1941 was free from early and late frosts, but it was extremely dry from early spring through the whole summer season, and due to this the hay and grain fodder crops, as well as vegetable crops, were light. Owing to the lack of rain, seeds for root crops did not germinate. In Dawson, production of tomatoes under glass was particularly good. During the year registrations under the Vital Statistics Ordinance were: Births, 93; marriages, 39, and deaths, 63. Government hospitals at Whitehorse and Mayo, and St. Mary's Hospital at Dawson, owned by the Sisters of St. Ann, were operated throughout the year and all received grants from the Territorial Government as follows: Whitehorse, \$6,000.00; Mayo, \$7,000.00; St. Mary's, \$36,000.00. The total number of adult indigents cared for in hospitals during the year was 63. Six schools were maintained during the year, as follows: Two at Dawson, one each at Whitehorse, Carcross and Mayo, and at the Elsa Camp on Galena Hill for the months of April to June, 1941, inclusive; the total enrolment of pupils at March 31, 1942 was 251. The number of teachers employed during the year was 10.

"The Territorial Government was relieved during the year of any responsibility in connection with the Whitehorse airport. Expenditures were made on both this and the Mayo airport. An emergency field at Braeburn was enlarged, the work being done by the White Pass Company; brush was cut from the Flat Creek emergency field."

Table 50.—Summary Statistics of Alluvial Gold Mining in Canada, 1940 and 1941

	1940			1941		
	(d) British Columbia	Yukon (e)	(g) (f) Quebec Saskatchewan and Alberta	(d) British Columbia	Yukon (e)	(g) (f) Quebec Saskatchewan and Alberta
Number of firms and individual operators (f).....	114	7	4	98	7	3
Capital employed.....\$	1,562,172	8,359,707	12,015	2,187,519	8,568,187	
Number of employees.....	351	472	(g) 17	393	403	1
Salaries and wages paid.....\$	557,685	1,104,145	18,949	625,173	1,328,995	110
Electricity generated for own use. K.W.H.	1,300	32,899,706		560,670	29,267,200	
Electricity generated for sale.....		4,091,994			3,722,000	
Crude gold recovered—crude.....ozs.	39,067	99,881	(a) 358	43,775	88,488	4
Platinum recovered.....ozs.	24			60		
Value of platinum recovered.....	938			2,293		
Quantity of material handled (h) cu. yds.	7,936,685	11,551,170		4,587,103	8,792,220	
Length of ditches.....miles (b)	149	57		140	56	
Total gross value of alluvial products.....	1,192,481	2,915,450		1,375,574	2,766,951	124
Fuel and electricity used (purchased).\$	43,284	92,030	654	46,439	109,079	
Process supplies used.....\$	39,022	18,556	764	54,972	13,517	
Cost of freight and express on dust, nuggets, bullion, etc., shipped (c).\$	1,887	40,741		2,947	42,942	
Cost of smelter, refinery and mint treatment on material shipped (c).\$	5,448	56,294		6,510	55,955	
Total Net Value of Alluvial Products.\$	1,102,840	2,707,829		1,264,706	2,545,458	124

(f) In addition to the number shown in the table, there were numerous small operators from whom returns were not obtainable; subject to revision.

(a) Recoveries for Alberta and Saskatchewan represent receipts of crude gold from Alberta and Saskatchewan at the Royal Canadian Mint, Ottawa, and the Dominion Assay Office, Vancouver, B.C. No other statistics available.

(b) Includes flume; in use.

(c) Information not completely available.

(d) Value of crude gold in Canadian funds in 1941 was estimated to be \$30.95 per crude ounce. In 1940 it was \$30.50.

(e) Value of crude gold in Canadian funds in 1941 was estimated to be \$31.27 per crude ounce. In 1940 it was \$29.19.

(f) Value of crude gold in Canadian funds in 1941 was estimated to be \$31.00 per crude ounce. In 1940 it was \$30.50.

(g) Quebec only—data not available for Alberta and Saskatchewan.

(h) Probably includes some overburden.

Table 51.—Alluvial Gold Recovered and Quantity of Material Handled (†) 1925-1941

Year	BRITISH COLUMBIA				YUKON				Average value gold per fine oz.
	Material handled	Gold recovered	Ounces per cw. yd.	Value per cu. yd.	Material handled	Gold recovered	Ounces per cu. yd.	Value per cu. yd.	
	cu. yds.	fine oz.	fine oz.	\$	cu. yds.	fine oz.	fine oz.	\$	
1925	(a)	13,181	(a)	.....	3,103,892	47,817	0-0154	0-318	20-67
1926	1,237,090	16,730	0-0135	0-279	2,501,200	25,344	0-0101	0-208	20-67
1927	2,470,552	7,353	0-0029	0-0599	2,421,489	30,778	0-0127	0-262	20-67
1928	1,188,667	6,739	0-0057	0-1178	5,097,182	34,116	0-0067	0-1385	20-67
1929	1,336,390	5,158	0-0039	0-0806	4,500,000	35,678	0-0079	0-1633	20-67
1930	224,339	7,164	0-0319	0-6593	3,559,642	35,160	0-0099	0-2046	20-67
1931	1,587,271	13,741	0-0086	0-1853	4,914,638	44,061	0-0090	0-1939	21-55
1932	1,053,677	16,320	0-0155	0-3637	6,051,256	40,373	0-0067	0-1572	23-47
1933	1,326,721	19,142	0-0144	0-4118	5,605,522	39,174	0-0070	0-2002	28-60
1934	2,034,522	20,145	0-0099	0-3415	6,315,070	38,703	0-0061	0-2104	34-50
1935	1,855,937	24,744	0-0133	0-4680	5,442,861	35,705	0-0066	0-2322	35-19
1936	2,083,934	34,711	0-0166	0-5815	8,067,159	50,192	0-0062	0-2172	35-03
1937	3,472,025	43,322	0-0125	0-4373	8,298,514	46,679	0-0056	0-1959	34-99
1938	4,138,746	46,207	0-0112	0-3939	8,870,628	71,303	0-0080	0-2813	35-17
1939	4,779,407	39,797	0-0083	0-2999	11,152,198	85,572	0-0077	0-2782	36-14
1940	6,680,457	32,128	0-0048	0-1848	11,551,170	79,905	0-0069	0-2656	38-50
1941	4,587,103	35,020	0-0076	0-2926	8,792,220	70,847	0-0081	0-3119	38-50

(†) In addition, relatively small amounts of alluvial gold have been recovered in Quebec, Saskatchewan and Alberta, but complete data are not available; also, data relating to material handled, particularly those pertaining to small operations, are not complete and necessitate estimates in order to obtain totals.

(x) Data partly conjectural and includes some overburden.

(a) Not available.

THE AURIFEROUS QUARTZ MINING INDUSTRY IN CANADA

The great part of the gold of Canada comes from the Canadian Shield, an immense area of precambrian rocks extending from the Labrador Coast westward almost to the mouth of MacKenzie River. The area of the shield is roughly 1,825,000 square miles, almost half of Canada. The deposits of the shield are of two main types, namely, quartz veins, from which most of the gold, up to the present time, has been won, and sulphide deposits which produce a smaller but very considerable proportion. The second great source of gold in Canada has been the Western or Cordilleran section, comprising British Columbia and Yukon Territory—the gold production from this section includes relatively large quantities obtained from alluvial deposits. The third principal area in which gold deposits occur is the Acadian region of Eastern Canada, the metal occurring principally in Nova Scotia where it has been mined since 1862.

The number of Canadian gold mining firms reporting mining operations in 1941 totalled 338 compared with 428 in 1940; 80 in 1929 and 65 in 1923. During the year under review, there were 357 properties in operation as against 438 in 1940; 255 mines reported production compared with 278 in the preceding year and 33 in 1923.

The gross value of output for the entire industry and including the value of all recoverable metals, gold, silver, etc., totalled \$179,103,182 in 1941 compared with \$178,790,485 in 1940. Of the 1941 total, \$120,703,979 represented recoveries from Ontario ores, \$31,386,312 from Quebec ores and \$19,378,045 from the gold mines of British Columbia.

Employees in the lode gold mining industry totalled 32,551 compared with 31,405 in 1940 and 5,524 in 1923. Salaries and wages paid amounted to \$62,150,810 as against \$55,205,096 in 1940, and fuel and purchased electricity consumed by the industry in 1941 totalled \$8,462,618. The cost of explosives, drill steel and other process supplies used in 1941 amounted to \$21,066,900.

Dividends paid during 1941, as computed from actual returns made by the lode gold mining industry, totalled \$46,563,187.

Nova Scotia Gold Mining Industry, 1941

(J. P. Messervy, Inspector of Metal Mines and Quarries, N.S. Department of Mines)

Nine gold mining properties, four of them steady producers, and several small prospects were active during the year. The total production of gold was 18,810 fine ounces, slightly lower than the figure for last year.

Consolidated Mining & Smelting Company Limited continued successful operations at Caribou Mines during the whole of the year. Practically all the stoping was confined to the ore above the 500 foot level but a new ore body of extensive proportions was proven and developed to a depth of 700 feet. This company also resumed underground investigations at the Dufferin Mine in the Salmon River district.

Guysboro Mines Limited continued operations steadily throughout the year at Goldenville. Most of the ore was derived from the 500 and 600 foot levels. New development was also carried out on the 400, 500 and 600 foot levels.

Work at Ayon Gold Mines Limited, which was resumed in the Dunbrack mine at Oldham, in October, 1940, was carried out steadily throughout the year. Under an agreement made at that time, the campaign of development was carried out under the direction and supervision of the Department of Mines. This consisted of development work on the 550, 675, 800 and 925 foot levels. The operation as a whole proved very successful.

Unfortunately, the operation of Seal Harbour Gold Mines Limited closed down the latter part of the season due to the tenor of ore becoming too low grade for profitable operation.

Queens Mines Limited continued underground operations during the whole of the year at Molega. Developments and work were confined to the 220 foot level. During the latter part of the year it was decided to increase the output of the mill and a larger ball mill unit with classifier, gold jig and wilfley table were added. This is expected to be in operation in February, 1942.

L. H. Doubles continued operations at Whiteburn during the year. Due to the shortage of labour and difficulty in getting supplies, he closed down the operation in December.

Goldbrook Limited unwatered and equipped the East Goldbrook mine in the Upper Seal Harbour district during the summer and commenced mining and milling operations in December.

A small amount of work was carried on at Country Harbor Mines and investigations were also continued during the summer months in the Miller Lake district.

The Rehabilitation Project at 15 Mile Stream operated jointly by the Federal and Provincial Departments of Labor, to rehabilitate coal miners from the Thorburn and other areas was carried on during the whole year. Underground work consisted in timbering the shaft to the 200 foot level and carrying out drifting and diamond drilling on the 200 foot level. During the latter part of the year a stamp mill was erected and several bulk tests taken from the ore shoots intersected and crushed with promising results.

Although the season's work proved satisfactory, it was decided to close down the operation late in December due to war conditions, shortage of trainees and experienced help.

The mine has been left fully equipped with a proper caretaker.

THE GOLD INDUSTRY IN QUEBEC, 1941

(A. O. Dufresne, Deputy Minister of Mines)

In 1941, the production of gold from Quebec mines reached the new high figure of 1,084,432 ounces valued at \$41,750,632. Twenty-seven mines, all located in western Quebec, contributed to the output of the yellow metal. No new producers were brought into operation in 1941, but two mines, the Mic-Mac, in Bousquet Township, and the West Malartic in Cadillac township were being groomed for initial production in 1942.

Twenty-seven per cent of Quebec's total output of gold was produced from the so-called base metal mines, and was in the nature of a by-product from the refining of copper. The remainder was produced from the "straight gold" mines, where the precious metals occur in association with quartz veins or highly silicified zones, and where recovery is usually effected by simple cyanidation processes. There were twenty-three "straight gold" mines in operation in western Quebec during the calendar year under review.

Prospecting was at low ebb throughout 1941. The number of claims recorded totalled 5,077 as compared with 5,285 in 1940 and 8,781 in 1939. The all-time record for prospecting in the province was in 1937, when the record figure of 18,641 claims were recorded.

In the western part of the Rouyn-Harricana area, eight straight gold mines were in production in the year under review. During the first four months of 1941, the Arntfield mill was under lease to Senator Rouyn Limited, but in late April, Arntfield resumed the mining and milling of its own ores. Production was further increased at the Francoeur mine. Tonnage at the Powell Rouyn mine was increased, a part being sent to the Noranda smelter as gold-bearing flux and the remainder being treated in the Company's mill. Stadacona Rouyn mines, Limited continued operations at a steady rate. The Senator Rouyn mill was completed in April, 1941, and for the remainder of the year was in continuous operation on a basis of 300 tons of ore per day. From October, 1940, when the mine was first brought into production, until April, 1941, Senator Rouyn ore was treated in the Arntfield mill. The Beattie mine and mill continued to operate on a basis of about 1,900 tons daily, and this Company extended its exploratory work to properties situated to the east of its holdings which included the Donchester and Central Duparquet groups. At the McWatters mine, a steady output was also maintained, and some promising new ore was found in the 702 zone on the 900-foot level to the east of the main workings. In Guillet township, seventy miles to the south of Rouyn, production at the Belleterre mine was increased to close to 350 tons per day.

The Bousquet-Cadillac area was active in 1941. Two new mines, the West Malartic and the Mic-Mac were equipped to commence production in 1942. The O'Brien mine was in continuous operation throughout the year, and the No. 4 internal shaft was deepened to 2,500 feet. Mining and milling operations were also carried out continuously at the Central Cadillac property, all ore being hauled to the Thompson Cadillac Mill for treatment. At the Wood Cadillac mine, there was a slight reduction in tonnage treated as compared with the previous year. The Amm mill was in operation throughout 1941 on ore from the No. 2 and No. 3 shaft workings of Pandora, Limited. Production was slightly lower at Lapa Cadillac, where the new North ore zone is providing ore of good grade but not fully amenable to simple gold recovery methods.

The producing mines of the Fourniere-Malartic area continued to expand operations in 1941, but total gold output remained constant as grade, in general, was reduced. The new treatment plant was placed in operation early in October, at the Canadian Malartic Mine, and this resulted in an increase in tonnage treated of over 22 per cent for the remainder of the year. Tonnage treated per day at Sladen Malartic averaged 700 tons, recovering amounting to \$3.39 per ton. Operations at the East Malartic mine were continued on a basis of 1,474 tons of ore daily. A further substantial increase in tonnage milled and gold produced was recorded at Malartic Goldfields which now ranks sixth in the list of Quebec's straight-gold producers. The discovery of a new orebody, half a mile to the west of the present workings, was one of the most outstanding events in the year in the gold mining industry, as the new zone has an indicated reserve of 6,000 tons of \$10.00 ore per foot of depth.

In the Bourlamaque-Dubuisson area, Lamaque continued to hold its position as the leading straight-gold producer of Quebec by a wide margin. At the Sigma mine, an addition to the cyanide plant was erected and production was increased. The rated capacity of the Siscoe mill was increased from 530 to 900 tons, but at the end of the year, 1,000 tons per day was being handled satisfactorily. Tonnage was also increased at the Sullivan Consolidated mine, and from the middle of October to the end of the year, this averaged 453 tons per day.

The Pascalis-Louvicourt area was active in 1941. Tonnage treated by Perron Gold Mines, Limited was slightly increased as compared with the previous year; but total gold recovery remained about the same as grade was somewhat lower. The Cournor mill was in steady operation throughout the year, with two-thirds of the mill feed coming from the Beaufor section and the remainder from the Cournor workings. Cournor Mining Company suspended operations in early 1942.

A considerable amount of exploration and development work was carried out in 1941 on other gold properties in the Western Quebec district. In addition to the Mic Mac and West Malartic mines already mentioned, exploratory underground work was carried out at the Duquesne property in Destor township, where a shaft was sunk to a depth of 515 feet, and a program of lateral work was completed at the 375- and 500-foot horizons. Shafts were also sunk and lateral work carried out on the Bochette group in Launay township, the National Malartic mine in Fourniere township and the Pershing Manitou property in Courville township. The shaft of the Pascalis Gold Mines property was completed in February, 1941 to a depth of 1,565 feet, and

over 5,000 feet of lateral work was accomplished on four levels. The Vicour group in Louvicourt township was further explored by drifting and an extensive diamond drilling campaign. Camp Bird Mines, formerly the Dorval-Siscoe property, carried out some exploratory underground work. Underground work was also carried out on the Gamma Mines (Quebec) group from the 350-foot level of the Sigma mine workings. All of these operations were suspended at the end of the year or in the early part of 1942, following the relegation of gold to a relatively unimportant place in the national war effort, and future trends in the production of gold from Quebec mines and in the development of new mines are dependent on the country's needs for the precious metal.

GOLD MINES OF ONTARIO, 1941

(Maurice Tremblay, Statistician, Ontario Department of Mines)

Only one property, operated by the Mayboro Milling Company, Limited, was active in the southeastern section of Ontario during 1941.

East Kirkland and Larder Lake areas: Lakeside Kirkland Gold Mines, Limited, pumped out the No. 1 shaft in September, 1941, and, after having checked previous work on a 300 foot level, allowed the mine to fill up with water again. As the result of the strike which was general in the Kirkland Lake camp, Bidgood Kirkland was forced to curtail its operations in November. Morris Kirkland Gold Mines, Limited, closed in December and the mill was sold. Upper Canada Mines, Limited, stepped up its mill tonnage slightly by adding a re-grind mill to its machinery. The old Murphy property was included in a new company called Queenston Gold Mines, Limited, which adjoins and is managed by Upper Canada Mines. Work of an exploratory nature was done on this property. Development work was continued at Laguerre Gold Mines, Limited, and nothing could be reported by Omega Gold Mines, Limited. The ore picture at Kerr-Addison Gold Mines, Limited, steadily improved. The No. 3 shaft was deepened to 2,050 feet. The shaft at the Chesterville mine was also deepened during the year and this work was being continued in 1941. The Wolfe Lake Mines, Limited discontinued its operations in October. Golden Gate Mining Company, Limited, milled about 65 tons of ore daily, a small tonnage was being supplied from the Crescent section of the property. Some high-grade ore was shipped by Kiryan Gold Mines, Limited, formerly Kirkland Consolidated. Yama Gold Mines was the only property in operation in the Boston Creek area. This mine entered production in the course of the year and a fair amount of development was done.

Kirkland Lake area: Production in the Kirkland Lake Belt was severely affected by a strike of the mine workers towards the end of the year. At the Teck-Hughes property, tonnage was cut to 250 tons and mining was confined to levels from the 5th to the 8th. At the year end, preparations were under way at Macassa Mines, Limited, to sink No. 1 winze below the 4,250-foot level. There were no new additions to the plant of Kirkland Lake Gold Mining Company, Limited. Lake Shore Mines, Limited, averaged 1,450 tons per day for the year. Level development was carried out on practically all levels from 600 feet to 5,590 feet. There were plans at Wright-Hargreaves Mines, Limited, to sink a winze below the 6,150-foot level. The mill of Sylvanite Gold Mines, Limited, averaged 540 tons per day during the year, and Toburn Gold Mines, Limited, treated 166 tons per day.

Porcupine District: For the first time in a considerable number of years, development work in the district in 1941 did not give evidence that some new property would likely reach the production stage in the ensuing year. However, two new gold producers came in, one the Hoyle Gold Mines, Limited, a major operation, commenced milling in January, 1941. The other new property, Bonetal Gold Mines, Limited, shipped ore in November to Broulan Porcupine Mines at an average of 111 tons daily. There was considerable construction work and increase in mill capacities at some of the mines during 1941, but inability to procure materials and slow delivery retarded the program somewhat. Aunor made provisions to increase tonnage, but this was held up by the non-delivery of a ball mill. The Ross mine of Hollinger Consolidated increased its mill

capacity. A new and larger headframe was erected and a new hoist and compressor was placed in service. In an effort to improve extraction, McIntyre made an addition to the mill, although this work was still incomplete at the end of the year. Naybob Gold Mines erected a new timer headframe, added to the hoist and compressor plant building and completed other construction. Expansion of milling capacity was noted at Pamour Porcupine Mines and Preston East Dome Mines.

Matachewan and West Shiningtree area: Matachewan Consolidated expanded their hoisting and milling capacity to 1,000 tons and the No. 3 shaft was deepened. On the surface a new hoist room was erected along with other buildings. There was little change at the Young-Davidson mine. In the Elk Lake district a little work was done by Messrs. Judson and Lunge at the Symasc, formerly the Mapes Johnson property, but work eased in September. During the latter part of the year, the main shaft at Tyrantite Mines, Limited, was deepened. Milling averaged 200 tons daily.

Sudbury and Nipissing District: Operations ceased at the New Golden Rose property in September. Jerome Gold sunk their shaft an additional 315 feet and the 500-ton mill started to operate in August. Rundle Gold Mine did some shaft sinking and level development. Much work was accomplished underground at the Renabie. The Cline Lake mine in Algoma carried on its operations throughout the year and a small amount of work was done by Regnery Metals. Electric power was brought in to this property.

Thunder Bay District: An unsuccessful attempt to find new ore caused operations at the St. Anthony Gold Mine to cease in the last week of December. Mining operations during the year were carried out mainly in the form of salvage operations. Tombill Gold Mines carried out operations normally throughout the year. McLellan Gold Mines, Limited, which replaced McLellan Long Lac Gold Mines, Limited, was subjected to considerable development work, but, owing to disappointing results, operations were suspended in November. Continuation of shaft sinking and level development was done at the Magnet Consolidated property. The mill handled ore for several small shippers. Some 186 men were employed throughout the year. A fourth roasting unit was installed and in operation by the middle of March at the McLeod-Cockshutt mine. This property was hoisting ore at the rate of 1,000 tons daily and the mill treated roughly 680 tons per day. The mine employed 450 men throughout the year. Little Long Lac Gold Mines installed a new winze station and hoist room with rope raise. Sinking was commenced in August and was nearly completed by the end of the year. A new 75-ton milling unit was installed and operated at the Hard Rock mine. This was for the purpose of treating quartz ore as distinct from sulphide ore which was the only type handled previously. The quartz ore does not require roasting. Bankfield Consolidated Mines, Limited, continued production throughout the year averaging about 100 tons daily. Exploration by diamond drilling and development was continued on the 525- and 1,275-foot levels for Magnet and Tombill extensions, respectively, as well as for Bankfield ore from the winze levels. All these operations met with disappointing results. At Brengold, which had been inactive since early in 1937, a lease was granted to Mr. Elmer Bray who employed two men to sort the high-grade sections of the ore dump and to mine high-grade from sections of the vein on surface. These men, who worked intermittently until September, were able to truck some 21 tons of ore to Magnet Consolidated from which 57 ounces of gold were recovered. It was then planned to unwater the shaft to 100 feet and recover high-grade section of the vein on that level to be milled by Magnet also. Sturgeon River Gold Mines, Limited, operated continuously during the year and the mill treated 70 tons of sorted ore daily. A new sorting plant was erected in the fall of the year. It was proposed to sort out the gold-bearing quartz, rather than the waste rock as previously, in order to increase the amount of ore milled. The Northern Empire Mines, Limited, was another producing mine which ceased operations. At the Leitch property, production at the rate of 85 tons of sorted ore daily was continued. By October of 1941, Sand River Gold Mining Company, Limited, planned to deepen the shaft about 300 feet to the top of the diabase sill and establish two new levels. A financing agreement was made with Northern Empire Mines Company who would advance the funds necessary for this and to pay off the mine's existing note. Norex Mines, Limited, a company formed to take over the interests of Spooner Gold Mines, Limited, made an arrangement with the adjoining

Northern Empire, late in 1940, whereby Northern Empire would drive into Spooner Gold Mines ground from their 1,725-foot level in order to prospect for ore at depth. Cross-cutting and drifting, which had been inaugurated in 1940, was continued in 1941.

Rainy River area: There was little activity in this area. Operations at the Upper Seine Gold Mines, Limited, the old Sawbill property, were intermittent and finally ceased in September. At the Lower Seine Mining Company, which was formed in 1940 to erect a mill on the property of the Orelia Mines, Limited, which included the old Golden Star Mine, operations were suspended in August. These consisted of alterations to the plant and the assembling of a test mill. Goldorel Mining Company, Limited, incorporated in August, 1941, took over the idle Orelia property. The Olive mine, situated some four and a half miles west of Mine Centre, was also taken over. On October 23 the mill and equipment were put in shape and dewatering the underground workings started on the 3rd of November. It was then proposed to start mining and milling as soon as possible.

Kenora District: Gold Eagle Gold Mines, Limited, operated continuously from January 1 to September 12. All underground equipment was then hoisted to surface and the mine workings allowed to flood. Howey Gold Mines operated continuously until November 3 when the shaft pillar between the 625- and 750-foot levels caved. Since the cage compartment of the shaft was not affected, the major part of the underground equipment was salvaged. Supplies which had been purchased to keep the mill operating until July of 1942 were sold to the mines in Red Lake and MacKenzie Island. The mill operated continuously throughout the year and the average tons milled per day was 1,060. In the northwestern-most section of the province, Sachigo River Exploration Company, Limited, continued production throughout the year, treating an average of 45.5 tons of ore daily. For the extent of the underground workings at Sachigo, the amount of water that had to be pumped daily was high. In July, 1941, some 300-350 gallons of water per minute were handled by the pumps. Straw Lake Beach Mines, Limited, continued operations until the middle of July with the mill treating about 60 tons of ore daily. During 1941, the Kenopo Mining and Milling Company, Limited, took an option on claims D-200 and D-148 on which the Mikado mine, Shoal Lake, is located. Construction was started on a concentrating plant to treat old tailings. Wampum Gold Mines, Limited, which is located 55 miles southeast of Kenora on Rowan Lake, erected building, collared the shaft, and completed 200 feet of sinking. The Goldwood Gold Mines, Limited was mined from January 19 to December 17 by J. D. Shannon, lessee of the property. The accumulation of some 40,000 tons of tailings which are supposed to contain about \$10 per ton were treated. McMarnac Red Lake Gold Mines, Limited, treated an average of 81.6 tons of ore daily. The surface ore dump was reclaimed in the course of the year. The new No. 2 shaft was deepened 300 feet and stations were cut at 600 and 750 feet. Development work at McKenzie Red Lake was most encouraging. Mining operations proper continued throughout the year, the mill treating an average of 230 tons of ore daily. The Uchi mine hoisted 279,223 tons of ore from all shafts, recovering therefrom 40,272 ounces of gold. As a result of unsatisfactory results the No. 3 shaft was closed down in September. Development and exploratory work featured operations of Gold Frontier Mines, Limited. Machinery for a 125-ton cyanide plant was purchased. The vertical, 3-compartment shaft at the Wendigo property was collared on the 1,100-foot level. Four shaft stations were cut and considerable drifting and crosscutting done. The mill at the Jason mine treated 48,362 tons of ore in 1941. Average recovery was \$15.89 per ton, the tailings averaging forty-six cents to show a production head of \$16.35, with a recovery of 97.2 per cent. Cochenour Williams Gold Mines, Limited, put into operation a sintering and smelting plant to treat the flotation concentrates. Otherwise, there was little new to report from this property. The No. 3 shaft of Hasaga Gold Mines, Limited, was collared on the 850-foot level and extended to a sump elevation of 1,675 feet. The No. 2 shaft of Madsen Red Lake Gold Mines, Limited, was extended 161 feet and a shaft station cut at an elevation of 1,250 feet. The mill of Central Patricia Gold Mines, Limited treated an average of 390 tons of ore daily. Exploration east and west of the main orebodies disclosed additional ore. Preparations were made for the sinking of a three-compartment internal shaft. The company presented its employees with a new club house. A new school building having hot-water heating and plumbing and accommodation for 40 pupils is now in use. At the Kenwest Gold Mines, operations centred on development and exploratory work.

MANITOBA GOLD INDUSTRY, 1941

(F. D. Shepherd, Acting Director of Mines)

Gold production in Manitoba for the year 1941 totalled 150,553 ounces as compared with 152,375 ounces produced in 1940. Gold was produced by six gold-quartz mines or properties and from the base metal ores of the Sherritt Gordon Mines Limited and the Hudson Bay Mining and Smelting Company Limited, the latter being the largest individual gold producer in the province.

Gold output from the Hudson Bay Mining and Smelting Co. credited to Manitoba was lower than in preceding years owing to the fact that a larger proportion of the ore treated was drawn from sections of the inter-provincial boundary. This decrease was almost entirely offset by expanded production at the San Antonio mine, while the output of other gold mines was normal.

San Antonio reported one of the most successful years in the mine's history. Following the heavy and successful development campaign carried out in 1940, a major expansion of the plant was completed in 1941 and capacity was raised from 330 to 550 tons per day by November. During 1941, 43,121 ounces of gold were produced as compared with 36,745 ounces in the preceding year. Ore reserves were substantially increased, and dividends totalling \$478,631 were paid to shareholders.

Output of the Gunnar Gold Mines Limited in the Beresford-Rice Lakes area was somewhat reduced from preceding years and totalled 14,869 ounces of gold. During 1941 the company continued intensive exploration on its lower levels and also examined numerous properties in the vicinity of the mine. On one of these, the Ogama property near Long Lake, the company completed a shaft to a depth of 125 feet and planned the mining of the small, high-grade body of ore indicated by diamond drilling. This ore will be treated at the Gunnar plant.

Exploratory work at the God's Lake Gold Mines Limited was concentrated in developing the area opened up by the new No. 2 shaft. Production was normal, and the year's gold output of the mine was 21,922 ounces.

During 1941 there was no marked increase in prospecting activity in Manitoba over the preceding year. There was, however, a trend toward greater diversification in prospecting, owing to the increasing demand for minerals of strategic importance. Interest was shown in discoveries of low-grade, nodular manganese occurrences in Porcupine Mountain area, and in tungsten occurrences in the Boundary area in southeastern Manitoba. Several promising discoveries of copper-zinc and copper-nickel were made, interest was revived in earlier known occurrences of base metals, and exploratory work is continuing on some of these properties. The outstanding new gold development of the year was that of Howe Sound Exploration Company in the Herb (Wekusko) Lake area. An intensive diamond drilling campaign was started at this property in 1941 and is being continued in the present year with encouraging results.

SASKATCHEWAN GOLD MINING INDUSTRY, 1941

(W. H. Hastings, Chief Inspector of Mines)

Saskatchewan gold production is derived from three sources, straight gold producers of which there are three, a base metal mine with a high gold recovery, and a negligible production from placer mining operations.

Flin Flon-Amisk Lake Area.—Hudson Bay Mining and Smelting Company at Flin Flon is the major gold producer in the province. Although a base metal mine, its complex ore carries values in gold and other precious metals. Tonnage increased during the year to 6,000 tons per day, an increase of approximately 1,000 tons over the rate at the beginning of the year. Numerous improvements to plant and equipment were made to take care of the increased tonnage. The outstanding improvements for the year included the completion of the new South main shaft to the 3,000 foot level, construction of a ten ton pilot plant for the re-treatment of an accumulated stock pile of zinc residues and the discontinuing of surface hauling of ore from the open pit. All ore from this source is now being recovered through the facilities of the underground workings.

Pamon Gold Mines Limited recorded a small but steady production throughout the year from their property on the west side of Amisk Lake. Exploitation to date is all in the form of development work.

Wampum Gold Mines Limited acquired the mining rights of Douglas Lake Gold Mines Limited and are preparing to reopen the old mine at Douglas Lake some four miles south and west of Flin Flon. The ore is an arsenical sulphide and in addition to gold, carries values in copper and zinc.

Athabaska Lake Area—The Box property of Consolidated Mining and Smelting Company at Goldfields operated to capacity throughout the year. The mill handles 1,300 tons of ore daily and development work is well ahead of production.

Lac la Ronge Area.—Preview Mines Limited took in a small eight ton gold milling plant to its property near Sulphide Lake, six miles north of Lac la Ronge. The mill was established and commenced operation during the latter part of 1941. A test mill is being considered for the property of Adolph Studer, also located on Sulphide Lake.

BRITISH COLUMBIA GOLD MINING INDUSTRY. 1941

(Philip B. Freeland, Chief Mining Engineer, British Columbia Department of Mines)

In the Atlin Mining Division the Polaris-Taku Mining Company continued operations during the year, and a total of 89,610 tons of ore was treated, and the concentrates shipped to Tacoma smelter. It is reported that this operation will close down about May of 1942, some of the contributing factors are reported shortage of labour due to war and difficulty in obtaining machinery. These, combined with high cost of supplies and lack of shipping facilities make the operation difficult.

The Portland Canal Division in 1941 was responsible for a tonnage output of 361,000 tons, of which the Silbak-Premier produced 170,504 tons of ore, containing 39,044 ounces of gold. The Big Missouri mill treated 190,436 tons. In the Skeena Mining Division the Surf Inlet Consolidated Gold Mines, Ltd., was responsible for a production of 13,161 ounces of gold from 39,310 tons of ore treated.

In the Cariboo Mining Division a total of 183,655 tons was treated, the Cariboo Gold Quartz being credited with 129,257 tons and containing 48,526 ounces of gold. The Island Mountain treated 54,398 tons with a yield of 24,757 ounces of gold.

The Omineca Division is credited with a total of 530 tons, and in addition several small properties shipped a few tons to the British Columbia Government Sampling Plant at Prince Rupert.

In the Kamloops area, clean-up operations were carried on at the Windpass, now in voluntary liquidation. Small shipments were also made from the Homestake and Riverside. A small tonnage was also shipped from two properties in the Vernon Division, the Kalamalka and Skookum.

The Greenwood Division experienced a busy year, with Providence and Old Granby (Phoenix) being the heaviest shippers. The Providence Mining Syndicate shipped a total of 1,837 tons, and the Old Granby was credited with nearly 9,500 tons. The Division in 1941 had a total gold production of 5,300 ounces.

The Osoyoos Division again was a high producer of gold, with the old Nickel Plate mine, operated by the Kelowna Exploration Company being the leading producer, with 94,476 tons treated. Hedley Mascot ranked second with a production of 68,000 tons containing 21,830 ounces of gold. Other producers were the Grandoro, Gold Standard, Morning Star, and a few others to make a total tonnage for the division of 166,919, and total gold production of 56,228 ounces.

The Copper Mountain mine of the Granby Consolidated Mining, Smelting and Power Co., Ltd., was responsible for a fair production of gold, but detail cannot be given owing to war-time regulations. The Highland Surprise was again the main producer in the Ainsworth Division. Several leasing operations in the Lardeau Division were responsible for a small yield of gold.

The Nelson Mining Division again saw many properties shipping, among these being the Sheep Creek Gold Mines Ltd., with a yield of 26,083 ounces from 55,052 tons treated; next came the Gold Belt with 15,811 ounces from 56,502 tons; next came the Bayonne with a tonnage of 20,224 and 8,274 ounces of gold. The Kootenay Belle produced 9,684 ounces from a tonnage of 34,644. The Alpine is credited with treating 2,600 tons. The Relief-Arlington Mines Ltd., treated 14,310 tons for a yield of 5,306 ounces, and the company has now gone into voluntary liquidation. The total tonnage for the Division is 241,134 and 90,908 ounces of silver. Trail Creek Mining Division had a total tonnage output of 18,000 and gold ounces of 7,357. The bulk of the tonnage came from the Rossland properties of the Consolidated Company and worked by leasers. It is reported all leasers have been given notice of the terminating of the leases in May, 1942. The Midnight and I. X. L. continued shipments in 1941.

In the Alberni Division, the W. W. W. owned by K. J. Robinson, and the Thistle, financed by R. A. Petre, again shipped small tonnages.

The Clayoquot Division, in which is the now famous Zeballos area, contributed a total of 62,770 ounces of gold from a tonnage of 123,061. The Privateer, together with a small Prident output, totalled 28,131 ounces from 31,354 tons. Next came Spud Valley Gold with a yield of 14,031 ounces from 34,549 tons. Mount Zeballos came along with 9,744 ounces from 21,261 tons, followed by 6,568 ounces from Central Zeballos and a tonnage of 14,322. Buccaneer Mines Ltd., entered the shipping list with a total of 19,475 tons treated. Other shippers were the Homeward, White Star, Big Boy and C. D.

Lillooet Division provided a total tonnage of 301,281 and a yield of 154,708 ounces of gold. The Pioneer is credited with 109,311 tons and 53,645 ounces of gold.

Several properties in the Nanaimo and New Westminster Divisions shipped a small tonnage the Dawson near Hope being the largest.

The Britannia in the Vancouver Division was responsible for the greater proportion in such area.

GOLD MINING IN NORTHWEST TERRITORIES, 1941

(C. S. Lord, Geological Survey, Department of Mines and Resources)

Gold accounted for about 77 per cent of the value of all minerals produced in Northwest Territories in 1941. Gold produced was valued at nearly \$3,000,000, which is a marked increase over that produced in 1940, and about 1½ per cent of the value of all gold produced in Canada in 1941. First continuous lode gold production started in 1938 and by the end of 1941 six gold mines, three of which started in 1941, were in production. Four of the producers, Con, Rycon, Negus and Ptarmigan mines are within six miles of Yellowknife, on the north shore of Great Slave Lake. About 84 per cent of all gold produced in Northwest Territories to the end of 1941 has come from Con and Negus mines. At the end of 1941 the combined milling rate of the six producers was about 450 tons a day and lateral workings in these mines aggregated about 50,600 feet. Mining operations had reached a depth of 1,053 feet and the deepest known gold ore was 675 feet below the surface. Practically all ore treated to date has come from depths of less than 500 feet. An average of 0.68 ounce of gold was recovered from each ton of ore milled during the year. A hydro-electric plant to develop not less than 4,200 horsepower, constructed by Consolidated Mining and Smelting Company of Canada, Limited, on Prosperous Lake, started delivering power early in the year. By the end of the year the plant was operating at about full load and supplying power to Con, Rycon, Negus, Ptarmigan, and Thompson-Lundmark mines, and to Yellowknife. Considerable construction was undertaken at several of the mines and at times the supply of local

labour was inadequate. Fewer prospectors were in the field in 1941 than in 1940, and fewer claims were recorded. Most prospecting was done east of Yellowknife near Gilmour and Francoise Lakes where many quartz veins have been found to contain gold and tungsten.

Con mine, owned by Consolidated Mining and Smelting Company of Canada, Limited, has produced more gold than any other mine in Northwest Territories and the value of this gold to the end of 1941 was about \$3,990,000. During the year the mill treated about 130 tons of ore daily from Con mine. The tonnage of ore mined was about the same as in 1940, but the gold content per ton was a little greater. Ore reserves are not available for publication. Considerable construction was done late in the year, including additions to the mill and camp and the erection of a steel headframe at C1 shaft. About 100 men were employed on this work from September to December, inclusive. The mine is serviced from C1 shaft with levels at depths of 125, 250, 375, 500, 650, 800 and 950 feet. Lateral work now totals about 22,450 feet and about 5,200 feet of this is below the 500-foot level. About 7,130 feet of lateral work was done during 1941, much of which was on the 950-foot level. Very little ore has been found below the 500-foot level. Considerable ore is reported to have been located on the 500-foot level. It is said to contain abundant sulphide minerals and to occur in bodies that are wider and of lower grade than the mine average. Electric locomotives and mucking machines are used in places. Current changes, and changes planned for the near future, include (1) installation of a new electric hoist and 4-ton skips at C1 shaft (2) deepening on C1 shaft to about 1,500 feet (3) increasing capacity of the mill to about 350 tons a day with provision for treatment of sulphide-rich ore from the 500-foot level and (4) construction of ore passes to the 950-foot level to allow most hoisting to be done from that depth.

Rycon mine is operated by Consolidated Mining and Smelting Company of Canada, Limited, from the same camp, mining, and milling plant as Con mine. About 35 tons of ore from Rycon mine were treated daily at the Con mill. Lateral workings total about 4,700 feet, of which 565 feet were completed during 1941. The deepest workings are at a depth of 500 feet and the mine is served by a 1,950 foot crosscut at that level from C1 shaft of Con mine. A second crosscut is being driven from Con mine on the 950-foot level and a raise will connect this with the 500-foot level at Rycon mine. Most ore has come from between the 500- and 250-foot levels.

Negus mine treated about 61 tons of ore a day during the year. Since starting production, the mine has produced gold valued at about \$2,060,000. Ore reserves at July 31, 1941, as reported by Negus Mines, Limited, were 25,460 tons containing 0.68 ounces of gold a ton. The main (No. 2) shaft was deepened to 734 feet and lateral work on the 100-, 200-, 300-, 425-, 550- and 675-foot levels now totals 10,580 feet. About 3,090 feet of this work was done in 1941. Most work to date has been done near No. 2 shaft, where ore has been found as deep as 675 feet. A drift on the 300-foot level is the sole connection between the group of workings near No. 2 shaft and another group lying about 1,250 feet south-southeast of the shaft. Exploration at this place has been confined to the 300-foot level and a 140-foot sub-level, and ore was found there for the first time during 1941. Most ore mined has come from above the 425-foot level near No. 2 shaft. Scheelite (tungsten) was discovered in the veins in 1941. Shrinkage stopes have been replaced by open timbered sill stopes in some veins. Negus mine was the first mine in Northwest Territories to pay dividends and first payments were made in 1941. Current and proposed changes include (1) installation of a skip in No. 2 shaft (2) construction of ore and waste passes to the 675-foot level and construction of loading pockets there (3) use of a storage battery locomotive and mucking machines and (4) increase of mill capacity to about 80 tons a day.

Ptarmigan mine, operated by Consolidated Mining and Smelting Company of Canada, Limited, started milling on November 27, 1941 and the first brick was poured on January 3, 1942. About 91 tons of ore were treated daily during December and gold was recovered by amalgamation and cyanidation. Ore reserves are not available for publication. All underground work has been done on a nearly vertical quartz vein that averages about 12 feet wide at the surface. The vertical shaft was deepened to 923 feet early in the year. At the end of the year lateral work on the six levels which are spaced at 150-foot intervals, totalled about 5,760 feet, of which about 1,000 feet was completed during 1941. First ore mined came from above the 450-foot level.

A mill erected at the property of **Thompson-Lundmark Gold Mines, Limited** by Consolidated Mining and Smelting Company of Canada, Limited started operating on August 19, 1941. Ore milled to the end of the year amounted to 11,915 tons containing 0.703 ounces of gold a ton. The operating profit to the end of the year was \$165,181. Ore reserves at January 1, 1942, as reported by Thompson-Lundmark Gold Mines, Limited, were 63,639 tons containing 0.59 ounces of gold a ton. Most of this ore and most of the gold was in the Fraser vein. All work during the year was done on the Fraser vein where a shaft 834 feet deep, at an incline of 47 degrees, serves levels 150 feet, 300 feet, 450 feet, 600 feet and 750 feet (slope distance) from the collar. Lateral work from this shaft totalled 2,824 feet at the end of 1941, and 910 feet of this was done during the year. Ore has been found on all levels except the 750-foot level (September, 1941). At the end of the year the company announced that further underground work would be done on the Kim vein.

On the **Ruth group** 4 miles west of Francois Lake, Consolidated Mining and Smelting Company of Canada, Limited, employed a crew of about 12 men during the summer. Three hundred feet of a quartz vein on Ruth 4 claim is reported to average one foot in width and to contain two ounces of gold a ton at the surface. A two-compartment inclined shaft was sunk to a depth of 100 feet and it is reported that a 20-ton mill will be installed during the winter of 1941-42.

The property of **Slave Lake Gold Mines, Limited**, on Outpost Islands, was re-opened in November, 1940 and continuous milling started in February, 1941. Ore reserves above the 200-foot level at June 30, as reported by Slave Lake Gold Mines, Limited, were 5,550 tons containing 0.69 ounces of gold a ton. At that date, 6,137 tons of tailings were estimated to contain 0.30 ounces of gold a ton. High-grade gold ore is reported to have been found east of No. 1 shaft on the 325-foot level later in the year. Former lateral work from this shaft on the 50-, 125-, 200-, 325-, and 425-foot levels totalled 1,825 feet and during 1941 some work was done on all levels and the total increased to about 2,990 feet. No. 2 shaft, about 2,000 feet west of No. 1 shaft, was started in October, and was 22 feet deep at the end of the year. The amalgamation-flotation mill treated about 43 tons daily and produced gold bullion, copper-gold concentrates, and tungsten-gold concentrates. Ore bodies are sheared and fractured quartzite, quartz-mica schist, and gneiss, cemented and partly replaced by quartz, chalcopyrite, pyrite, ferberite (a tungsten mineral), gold, and other minerals. Most gold is recovered by amalgamation. Mill operations to June 30 indicated that the fine grinding required to recover a reasonable proportion of the gold resulted in an excessive and unexpected loss of ferberite (tungsten) due to sliming.

Mercury Gold Mines Limited continued surface work on the Dingo group, 150 miles north-northwest of Yellowknife. A steam mining plant was hauled to the property from Ft. Rae by tractor early in the year. Work done included 5,400 feet of diamond drilling, trenching and bulk sampling, and a survey of a hydro-electric power site on Emile River eight miles west-southwest of the property. About 12 men were employed until September when work stopped. Several interesting bodies of gold-bearing quartz were found on the surface but results from diamond drilling were less encouraging.

YUKON

Only the usual assessment work was performed on quartz properties in the Wheaton, Watson and Carcross areas of the Whitehorse Mining District. Active interest is being shown by a group of Juneau men in antimony claims in the Wheaton District, owned by W. McAllister. It was reported that development work would start early in 1942. In the Dawson District, the Pioneer Mining Co., Limited, of British Columbia secured an option on the property of the Lone Star Consolidated; a bulk sample of twenty to thirty tons was shipped outside for a mill test. Twenty quartz grants were issued in the Dawson District during the year.

Table 52.—Principal Statistics of the Auriferous Quartz Mining Industry in Canada, for Years Specified

	Number of active operators	(c) Number of operating plants or mines	Capital employed	Number of employees	Salaries and wages	Cost of fuel and electricity	(b) Cost of process supplies used	Value of freight paid on shipments of ore, slag, etc.	Smelter and refinery treatment costs	Gross value of bullion, ore, concentrates or residues shipped from mines (d)	Net value of bullion, ore, concentrates or residues shipped from mines (d)
			\$	\$	\$	\$	\$	\$	\$	\$	\$
1923.....	65	65	77,574,976	5,524	8,961,434	1,497,197	Data not available	Data not available		(a) 25,021,837	Data not available
1929.....	80	85	135,166,105	8,660	14,258,733	2,579,481	Data not available	Data not available		(a) 37,275,986	Data not available
1940.....	428	438	250,919,160	31,405	(e) 55,205,096	8,147,304		691,649	2,486,587	178,730,485	146,713,744
1941—											
Nova Scotia.....	11	12	440,528	261	315,154	52,019	99,474	1,127	8,188	737,740	576,932
Quebec.....	88	93	42,741,363	6,386	11,502,849	1,854,389	3,877,009	87,177	474,890	31,386,312	25,092,847
Ontario.....	96	99	169,500,134	21,007	40,834,236	5,427,354	13,758,759	375,075	1,365,347	130,703,979	99,777,444
Manitoba.....	6	6	3,717,198	637	1,196,305	188,367	411,649	6,720	34,437	3,065,461	2,454,588
Saskatchewan.....	3	3	17,529	204	424,235	27,715	274,518	18,783	20,599	941,372	599,757
British Columbia.....	127	137	22,939,476	3,511	6,721,978	735,291	2,309,128	421,840	747,455	19,378,045	15,164,331
Northwest Territories.....	7	7	3,792,586	545	1,156,053	177,483	336,363	5,601	27,592	2,860,273	2,313,234
Yukon.....											
Canada.....	338	357	243,138,864	32,551	(e) 62,150,810	8,462,618	21,066,900	916,223	2,678,508	179,103,132	145,978,833

(a) Less freight and treatment charges.

(b) Explosives, chemicals, etc.

(c) Number of mines producing—1923—33; 1939—38; 1937—189; 1938—226; 1939—232; 1940—278; 1941—255.

(d) Value of bullion produced plus value of ore, concentrates, etc. shipped.

(e) Includes \$7,415,094 in salaries in 1941 and \$6,794,255 in 1940.

Note:—Net value represents the gross value less the cost of fuel and electricity, process supplies, freight and treatment costs.

Table 53 (a).—Principal Statistics Relating to Producers only in the Auriferous Quartz Mining Industry in Canada, 1941

	Number of producing plants or mines	Capital employed \$	Number of employees	Salaries and wages \$	Cost of fuel and electricity \$	(a) Cost of process supplies used \$	Value of freight paid on shipments of ore, slag, etc. \$	(b) Smelter and refinery treatment costs \$	Gross value of bullion, ore, concen- trates or residues shipped from mines (d) \$	Net value of bullion, ore, concen- trates or residues shipped from mines (d) \$
Nova Scotia.....	11	440,528	255	309,499	50,647	97,159	1,127	8,188	737,740	580,619
Quebec.....	20	37,610,922	5,962	10,881,794	1,767,892	3,606,400	87,177	474,890	31,386,312	25,449,953
Ontario.....	88	163,493,515	20,828	40,530,658	5,392,193	13,697,971	375,075	1,365,347	120,703,979	99,873,393
Manitoba.....	6	3,717,198	637	1,196,305	188,367	411,649	6,720	34,437	3,095,461	2,454,288
Saskatchewan.....	3	17,529	204	424,235	27,715	274,518	18,783	20,599	941,372	599,757
British Columbia.....	120	22,586,423	3,429	6,584,457	731,883	2,297,438	421,840	747,455	19,378,045	15,179,429
Northwest Territories.....	6	3,769,758	535	1,136,087	177,483	336,363	5,601	27,592	2,860,273	2,313,234
Yukon.....										
Total Canada 1941.....	255	231,635,873	31,850	61,063,035	(e) 8,336,180	20,721,498	916,323	2,678,508	179,103,182	146,450,673
Total Canada 1940.....	278	230,719,341	30,353	53,560,935	7,835,193	20,390,754	691,649	2,486,587	178,794,078	147,239,865
Total Canada 1939.....	232	214,326,059	29,001	50,891,920	(e) 7,701,026	19,001,752	694,165	2,249,312	160,014,172	130,367,887

(a) Explosives, etc.

(b) Includes handling charges.

(c) Not recorded separately—included with data relating to non-ferrous smelting industry in British Columbia.

(d) Value of bullion **produced** plus value of ore, concentrates, etc., **shipped**.

(e) Includes \$7,214,016 in salaries in 1941 and \$6,794,255 in 1940.

Table 54.—Ores Mined and Milled, Crude Bullion Recovered and Concentrates Shipped in the Auriferous Quartz Mining Industry, 1941

	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	British Columbia	Northwest Territories	Canada
Number of producing mines.....	11	26	83	6	3	120	6	255
Ore mined..... tons	60,000	4,835,120	12,766,523	265,878	496,780	1,516,472	90,993	20,031,736
Material discarded (sorted)..... tons	25,098	222,098	565,351	3,584	.....	11,713	3,113	336,003
Ore milled..... tons	60,000	4,434,507	12,227,706	262,188	494,186	1,437,589	110,097	19,036,233
Tailings retreated..... tons	40	.....	464,037	.....	.....	16,212	.....	480,289
Concentrates produced..... tons	234	4,289	110,151	10	.....	43,862	2,210	160,556
Gold content of ores, slags, residues and concentrates shipped—								
To foreign smelters..... fine oz.	.....	.....	37,253	.....	.....	152,389	.....	180,094
To Canadian smelters..... fine oz.	.....	21,181	3,488	119	2,821	22,707	382	50,316
Bullion bars shipped—								
Gold content..... fine oz.	18,167	786,617	2,959,214	80,203	21,810	342,097	74,048	4,282,156
Silver content..... fine oz.	529	153,625	531,467	11,299	8,088	106,630	15,480	827,118
Bullion produced by amalgamation..... crude oz.	30,263	62,577	385,328	21,060	.....	164,265	56,784	720,277
Bullion produced by cyanidation..... crude oz.	435	983,417	3,508,620	92,282	33,103	292,862	40,124	4,950,843
Total Bullion Produced..... crude oz.	30,698	1,045,994	3,893,948	113,342	33,103	457,127	96,908	5,671,120
Content of bullion bars produced—								
Gold..... fine oz.	19,168	792,038	3,075,234	80,208	21,810	343,718	73,809	4,405,986
Silver..... fine oz.	601	154,220	539,547	11,302	8,088	107,865	15,283	836,906
Gold value (standard)..... \$	395,999	16,372,878	63,595,788	1,658,063	450,866	7,105,144	1,525,769	91,104,567
Silver value..... \$	220	59,006	201,581	4,203	3,011	39,941	5,715	313,677
Exchange premium on bullion bars produced..... \$	341,521	14,120,585	54,793,532	1,429,777	388,846	5,175,676	1,313,544	77,563,781
Value of ores, concentrates, slags and residues sold..... \$	.....	833,843	2,112,778	3,418	98,649	7,057,284	15,245	10,121,217
Total Gross Value of Production..... \$	737,740	31,386,312	120,703,979	3,095,461	941,372	19,378,045	2,860,273	179,103,182
Value of fuel, electricity and process supplies used, also freight on shipments, marketing, smelter and refining charges..... \$	160,808	6,293,465	20,926,535	641,173	341,615	4,213,714	547,039	33,124,349
Net Value of Production..... \$	576,932	25,092,847	99,777,444	2,454,288	599,757	15,164,331	2,313,234	145,978,833

Table 55.—Ores, Concentrates, Slags, etc., Shipped to Smelters from Canadian Gold Mines, 1929-1941

	To Canadian plants						To Foreign plants					
	Ores			Concentrates			Slags, residues, precipitates			Ores		
	Tons	Gold content fine oz.		Tons	Gold content fine oz.		Tons	Gold content fine oz.		Tons	Gold content fine oz.	
1929.....	27,278	14,327	305	268	24	82,996	1	90,871	2,370	3,638	6	304
1930.....	52,540	22,910	9,665	1,187	117	22,432	2	70,497	18,276	46,102	53	1,009
1931.....	51,579	21,756	16,805	3,120	1,505	11,870	12	24,224	20,271	48,743	47	1,306
1932.....	36,397	17,943	952	191	1,416	15,810	26	36,736	16,925	52,508	30	869
1933.....	30,096	14,882	1,349	490	6,279	2,203	55	3,292	29,111	76,601	34	1,392
1934.....	48,106	29,688	10,440	2,490	1,487	1,936	203	1,419	43,053	114,476	27	599
1935.....	18,239	7,008	35,958	7,045	6,231	2,840	58	1,242	46,050	90,167	25	11,310
1936.....	4,705	6,567	34,654	7,865	3,609	3,421	64	1,894	65,660	137,273	25	16,903
1937.....	37,126	9,649	21,865	6,981	2,060	8,108	130	2,516	62,987	163,781	74	912
1938.....	172,377	36,008	25,552	8,404	420	8,443	37	4,445	40,828	142,513	1,281	23,101
1939.....	271,666	47,114	24,184	7,747	4,507	8,830	797	3,853	39,530	112,126	235	26,631
1940.....	201,941	34,315	13,532	4,485	3,761	8,107	158	7,453	44,570	125,704	103	47,160
1941.....	202,943	38,380	7,492	1,628	4,444	11,222	369	7,453	43,855	122,619	115	56,183
Grand Total.....	1,154,993	300,547	202,753	51,901	35,860	188,318	1,912	255,865	473,466	1,236,251	2,055	187,679

Table 56.—Ores, Concentrates and Slags Shipped from the Auriferous Quartz Mines in Canada, 1941

	Ontario mines shipping		Quebec, Saskatchewan, Northwest Territories and Yukon mines shipping		British Columbia mines shipping		Canada
	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	To Canadian smelters	To Foreign smelters	
Number of mines.....	16	5	12	3	95	21	152
Tons of ore, etc., shipped.....	629	4,425	175,727	449	28,584	46,549	256,363
Metal content—							
Gold.....oz.	3,488	37,253	24,121	382	22,707	152,389	240,340
Silver.....oz.	11,968	1,208,869	1,730		71,995	641,992	1,936,554
Copper.....lb.	17,854	441,893	742	33,517	2,656	225,099	721,761
Lead (a).....lb.		1,042,006	70,255		278,287	1,938,384	3,328,932
Zinc.....lb.						1,605,954	1,605,954
Value—Gross (b)....\$	132,937	1,979,841	930,885	20,270	878,405	6,178,879	10,121,217

(a) Some gold ores exported contain relatively large quantities of lead which are not reported by the producer; this lead is reported by the U.S. Smelters and 50 per cent is credited to Canadian lead production.

Any antimony recovered from Canadian ores in Canadian smelters is not usually reported by mine operators.

† In addition includes 42,702 pounds cadmium.

(b) Included in value of shipments from Quebec are 1,736,000 pounds As_2O_3 to Canadian firms and 552,000 pounds As_2O_3 to foreign firms, also 803 pounds of tungsten concentrates to Canadian firms. Also in addition were 13,222 pounds of tungsten concentrates to foreign firms from N.W.T., tungsten concentrates shipped from other provinces are included with miscellaneous metals.

Table 57.—Specified Costs per Ton of Ore Milled at certain of the Principal Auriferous Quartz Mines in Canada, 1941

Name of mine	Development and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
	\$	\$	\$	\$	\$
NOVA SCOTIA					
Avon Gold Mines Ltd.....	3.83	4.39	0.86	(f)	9.08
Consolidated Mining & Smelting Company of Canada Ltd. (Holman).....	2.92	5.39	1.82		10.13
Guysborough Mines Ltd.....	1.559	1.953	0.995	1.261	5.768
QUEBEC					
Arntfield Gold Mines Ltd.....	1.093	3.019 (x)	1.117 (x)	0.975	6.204
Beattie Gold Mines Ltd.....	0.241	0.674	1.087	0.332	2.334
Belleterre Quebec Mines Ltd.....	1.702	2.843	1.222	2.058	7.825
Fraucoeur Gold Mines Ltd.....	0.386	1.515	1.121	0.864	3.886
Lamaque Mining Co. Ltd.....	1.720	2.220	0.625	0.648	5.213
Lapa Cadillac Gold Mines Ltd.....	0.579	1.863	1.173	0.651	4.266
Malartic Gold Fields Ltd.....	1.030	2.170	0.698	0.647	4.545
McWatters Gold Mines Ltd.....	2.390	1.949	1.357	0.950	6.646
O'Brien Gold Mines Ltd.....	0.97	3.51	1.38	1.21	7.07
Pandora Cadillac Gold Mines Ltd.....	0.495	3.077	0.909	0.531	5.012
Perron Gold Mines Ltd.....	2.529	3.115	0.807	0.896	7.347
Powell Rouyn Gold Mines Ltd.....	0.31	1.77	0.88	0.35 (g)	3.31 (i)
Senator-Rouyn Ltd.....	1.041	1.542	1.455	1.602	5.640
Sigma Mines Ltd.....	1.140	2.378	0.571	0.339	4.428
Sisocoe Gold mines Ltd.....	0.9803	1.9788	0.8196 (j)	0.5984	4.3771
Sladen-Malartic Mines Ltd.....	0.37	1.40	0.63	0.31	2.71
Wood Cadillac Mines Ltd.....	1.53	2.47	1.05	0.51	5.56
ONTARIO					
Porcupine District					
Broulan Porcupine Mines Ltd.....	0.37	1.92	0.70	0.79	3.78
Coniarum Mines Ltd.....	2.00	3.35	0.68	1.27	7.30
De Santis Porcupine Mines Ltd.....	2.02	2.49	1.17	0.68	6.36
Dome Mines Ltd.....	0.946	1.728	0.979	3.540	7.193
Hollinger Consolidated Gold Mines Ltd. (Timmins).....	0.9803	2.8246	0.5922	2.1197	6.5168
Hollinger Consolidated Gold Mines Ltd. (Ross).....	1.0471	2.0498	1.6126	1.6030	6.3125
McIntyre Porcupine Mines Ltd.....	0.704	3.763	0.793	2.115	7.375
Pamour Porcupine Mines Ltd.....	0.61	1.36	0.54	0.29	2.80
Paymaster Consolidated Mines Ltd.....	1.95	2.98	1.14 (e)	0.55	6.62

Table 57.—Specified Costs Per Ton of Ore Milled at Certain of the Principal Auriferous Quartz Mines in Canada, 1941—Concluded

Name of mine	Development and exploration (a)	Mining	Milling	General (b)	Total cost per ton (c)
ONTARIO—Concluded					
Kirkland Lake District					
Bidgood Kirkland Gold Mines Ltd.....	3-17	4-44	1-65	1-22	10-48
Golden Gate Mining Co. Ltd.....	2-90	3-41	1-97	1-30	9-58
Kirkland Lake Gold Mining Co. Ltd.....	1-39	3-69	1-22	2-10	8-40
Macassa Mines Ltd.....	1-51	3-21	1-17	4-18	10-07
Toburn Gold Mines Ltd.....	2-04	5-15	2-21	0-30	9-70
Teck-hughes Ltd.....	(f)	4-02	1-01	2-50	7-53
Upper Canada Mines Ltd.....	2-30	3-52	1-04	2-19	9-05
Wright-Hargreaves Mines Ltd.....	(f)	4-507	1-128	5-096	10-731
Larder Lake District					
Chesterville Larder Lake Gold Mining Co. Ltd.....	0-35	1-46	0-83	0-72	3-36
Kerr-Addison Gold Mines Ltd.....	0-88	1-18	0-63	1-39	4-08
Omega Gold Mines Ltd.....	0-654	2-390	1-147	0-100	4-291
Yama Gold Mines Ltd.....	1-18	4-70	2-66	2-71	11-25
Matatchewan District					
Hollinger Consolidated Gold Mines Ltd. (Young Davidson).....	0-2214	1-5008	0-6940	0-6651	3-0813
Matatchewan Consolidated Mines Ltd.....	0-528	1-827	0-733	0-513	3-691
Jerome Gold Mines Ltd. (Sudbury District).....	0-198	2-339	0-788	0-977	4-302(l)
Thunder Bay and Kenora Districts					
Bankfield Consolidated Mines Ltd.....	0-9378	2-8136	1-6182	1-6496	7-0192
Leitch Gold Mines Ltd.....	3-97	6-30	2-21	6-25	18-73
MacLeod-Cockshutt Gold Mines Ltd.....	1-0920	2-7028	1-6199	1-4121	6-8268
Wendigo Gold Mines Ltd.....	0-96	3-86	2-03	2-49	9-34
Patricia District					
Central Patricia Gold Mines Ltd.....	1-42	3-04	1-28	2-77	8-51
Cochonour Williams Gold Mines Ltd.....	2-112	2-192	2-902	2-225	9-43(m)
Howey Gold Mines Ltd.....	.....	0-678	0-541	0-353	1-552(n)
Jason Mines Ltd.....	1-830	4-484	1-645	1-430	9-389
McKenzie Red Lake Gold Mines Ltd.....	1-49	3-00	1-15	1-13	6-77
MANITOBA					
God's Lake Gold Mines Ltd.....	2-91	2-86	1-55	1-89	9-21
NORTHWEST TERRITORIES					
Con Mine.....	(h)	(h)	(h)	(h)	(h)
Rycon Mine.....	(h)	(h)	(h)	(h)	(h)
Negus Mines Ltd.....	(h)	(h)	(h)	(h)	(h)
Thompson-Landmark.....	(h)	(h)	(h)	(h)	(h)
BRITISH COLUMBIA					
Bayonne Cons. Mines Ltd.....	1-23	6-14	3-27	1-63	12-27
Bralorne Mines Ltd.....	1-28	3-27	0-74	2-05	7-34
Buccaneer Mines Ltd.....	5-01	8-88	4-52	9-89	28-30
Buena Vista Mining Co. Ltd.....	0-16	1-07	1-05	.....	2-28
Cariboo Gold Quartz Mining Co. Ltd.....	2-041	5-673	1-255	0-382	9-351
Cons. Nicola Goldfields Ltd.....	1-07	2-30	1-48	1-04	5-89(d)
Gold Belt Mining Co. Ltd.....	2-02	4-35	1-26	0-67	8-30
Hedley Mascot Gold Mines Ltd.....	1-26	2-36	2-03	2-09	7-74
Island Mountain Mines Co. Ltd.....	3-61	3-55	1-89	0-32	9-37
Kootenay Belle Gold Mines Ltd.....	2-58	6-13	1-65	1-33	11-69
Livingstone Mining Co., Ltd.....	2-430	7-50	6-00(k)	2-50	19-50(d)
Mount Zeballos Gold Mines Ltd.....	2-430	6-484	2-099	2-512	13-525(i)
Pioneer Gold Mines of B.C. Ltd.....	0-888	3-933	1-156	4-840	10-817
Privateer Mine Ltd.....	2-92	5-88	2-09	8-28	19-17
Relief Arlington Mines Ltd.....	0-634	6-280	1-947	2-487	11-348
Reno Gold Mines Ltd., Zeballos.....	3-759	4-895	3-046	3-310	15-010
Sheep Creek Gold Mines Ltd.....	1-674	3-102	1-572	1-086	7-434
Spud Valley Gold Mines Ltd.....	0-70	7-25	2-71	2-25	12-91(d) (i)
Surf Inlet Cons. Gold Mines Ltd.....	2-282	3-216	1-377	1-158	8-033(d)
Ymir Yankee Girl Gold Mines Ltd.....	0-129	1-771	1-513	0-756	4-169(d)

(a) Exclusive of outside exploration.

(b) Marketing, head office, taxes, etc.

(c) Depreciation not included.

(d) Shipped to smelter.

(e) Includes crushing and conveying.

(f) Included under mining.

(g) Not including taxes.

(h) Not available for publication.

(i) Bullion made and crude ore shipped.

(j) Includes sorting.

(k) Includes smelting and freight.

(l) Milling commenced August 26th.

(m) Includes smelter costs.

(n) Mining ceased November 4th.

(x) Includes Senator tonnage.

Table 58.—Certain Data Relating to the Production of Gold by the Entire Auriferous Quartz Mining Industry in Canada, 1928-1941

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter-refinery treatment on ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1928.....	206	1.47	7.45	Information not available	Information not available	.....
1929.....	218	1.46	7.18	.....	.....	.....
1930.....	237	1.25	6.63	.....	.....	.....
1931(a).....	250	1.19	6.50	.....	.....	.....
1932.....	255	1.21	6.31	.....	.....	.....
1933(b).....	207	1.36	7.45	.....	.....	.....
1934(c).....	154	1.71	9.64	.....	.....	.....
1935.....	146	1.89	10.48	4.38	.....	16.75
1936.....	137	1.98	11.32	4.46	.....	17.76
1937.....	132	2.10	12.18	4.65	0.33(d)	19.26
1938.....	150	1.85	10.95	4.53	0.56	17.89
1939.....	157	1.81	10.69	4.45	0.67	17.62
1940.....	161	1.76	10.48	4.49	0.69	17.42
1941.....	155	1.82	11.56	4.53	0.77	18.68

(a) Equalization exchange premiums paid by the Dominion Government to gold miners (Great Britain goes off gold standard).

(b) United States goes off gold standard.

(c) United States gold dollar reduced in weight from 25.8 to 15 5/21 grains, 0.9 fine.

(d) Not including mint charges and marketing prior to 1938.

NOTE.—The data contained in the foregoing table have been compiled from reports received from both producing and non-producing (exploring and developing) operators in the auriferous quartz mining industry. This fact should be noted if the information is to be construed or employed as possible criteria for technological or other statistical study. The trends revealed are not to be interpreted as entirely reflecting "cause and effect" in the operation of producing mines *only* but rather as indices of change in the industry as a whole. For data relating to producers only, see following table.

Table 59.—Certain Data Relating to Producing Mines Only in the Auriferous Quartz Mining Industry in Canada, 1931, 1939-1941

Year	Ounces of gold produced per wage-earner year	Cost of fuel and electricity per ounce of gold produced	Cost of wages per ounce of gold produced	Cost of explosives and other process supplies used per ounce of gold produced	Cost of freight and smelter-refinery treatment of ores and bullion shipped per ounce of gold produced	Total of specified costs
	Ounces	\$	\$	\$	\$	\$
1931.....	256	1.19	6.38	(a)	(a)	.....
1939.....	164	1.76	10.25	4.33	0.67	17.01
1940.....	165	1.72	10.20	4.41	0.69	17.02
1941.....	158	1.79	11.37	4.46	0.77	18.39

(a) Data not available.

Table 60.—Ores Mined and Treated by Auriferous Quartz Mining Industry, for Years Specified

Year	Ore hoisted	Ore milled (c)	Crude ore shipped to smelters (d)	Low grade sorted out	Tailings retreated	Gold recovered as bullion (b)	Gold in crude ore shipped	Gold in concentrates, slag, etc., shipped
	Tons	Tons	Tons	Tons	Tons	Fine oz.	Fine oz.	Fine oz.
1925.....	3,646,460	3,527,021	118,436†	(a)	48,475	1,482,294	97,011	34,131
1930.....	4,472,803	4,306,869	123,037	(a)	37,095	1,782,556	45,342	56,893
1935.....	8,832,901	8,888,129	19,481	(a)	57,798	2,492,145	9,848	143,666
1936.....	10,694,208	10,504,181	6,569	(a)	33,814	2,903,063	9,988	192,439
1937.....	12,388,489	11,880,323	39,642	457,622	97,710	3,283,795	17,757	188,618
1938.....	14,749,649	14,158,555	176,822	528,696	64,926	3,810,642	44,451	191,586
1939.....	17,105,744	16,150,173	275,519	660,578	18,426	4,160,352	56,044	167,448
1940.....	18,986,306	18,083,439	209,394	757,538	180,311	4,386,673	42,422	190,157
1941.....	20,031,736	19,026,273	210,396	936,003	480,289	4,405,986	49,602	190,738 (d)

(a) Not available.

(b) Content of bullion shipped 1925-1935; 1936-1941 content of bullion produced.

† In addition, a relatively small tonnage of unclassified ores was shipped.

(c) + (d) = total crude ore treated (not including sorted material).

(d) Gold in material shipped by gold mines to other gold mines for treatment is included under bullion.

Table 61.—Gold Content of Bullion, Ores, Concentrates, Etc., Shipped and Ore Milled by Auriferous Quartz Mines in Canada, with Average Price of Gold in Canadian Funds, 1929-1941

Year	Tonnage treated (*)	Gold content fine oz. (†)	Oz. of fine gold per ton	Average price of gold \$
1929	4,371,143	1,771,526	.41	20.67
1930	4,429,906	1,884,791	.43	20.67
1931	5,526,379	2,271,278	.41	21.55
1932	5,997,492	2,502,327	.42	23.47
1933	6,480,164	2,455,365	.38	28.60
1934	7,524,803	2,490,513	.33	34.50
1935	8,907,610	2,645,659	.30	35.19
1936	10,510,750	3,095,427	.29	35.03
1937	11,919,965(a)	3,490,170	.29	34.99
1938	14,335,377(a)	4,046,679	.28	35.17
1939	16,425,692(a)	4,383,844	.27	36.14
1940	18,292,833(a)	4,619,252	.25	38.50
1941	19,236,669(a)	4,646,326	.24	38.50

(*) Does not include tailings retreated, but includes ore milled plus crude ore shipped to smelters.

(†) Relatively small quantity of gold contained in concentrates, slags, etc., shipped and cyanide solution in circuit may have originated in ores treated during the previous year; from 1937 represents metal content of total bullion produced plus metal in ores or concentrates shipped to smelters.

(a) Material discarded by sorting not included.

Table 62.—Milling Capacity of Producing Canadian Gold Mines, 1935-1941
(Tons of 2,000 pounds per 24 hours)

	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	British Columbia	Northwest Territories
1935	292	3,368	20,921	1,465		2,990	
1936	713	4,514	22,639	1,000		4,120	
1937	565	6,090	25,249	975	30	3,915	
1938	542	8,217	30,067	875	1,000	4,590	
1939	562	9,580	33,324	865	1,000	4,417	
1940	450	11,215	35,030	690	1,200	4,255	275
1941	319	12,654	37,416	990	1,355	4,510	510

Table 63.—Principal Statistics Relative to All Ontario Gold Mines by Areas* 1941

Camp or district	Number of producers	Ore † treated	Total gold recovered	Average ounces per ton recovered	Employees	Salaries and wages paid	Cost of fuel, electricity and process supplies
1941		Tons	Fine oz.		No.	\$	\$
Porecupine	21	5,974,447	1,439,148	.24	9,746	19,230,445	8,860,778
Kirkland Lake	12	(b)1,900,481	743,123	.39	4,359	8,253,004	4,161,044
Larder Lake	4	1,124,221	205,766	.18	1,135	2,347,675	1,310,202
Matachewan	2	543,677	58,683	.11	521	999,239	694,555
Sudbury	4	148,119	23,420	.15	468	913,103	335,246
Algoma	3	89,432	11,565	.13	166	291,953	148,645
Thunder Bay	16	(a) 823,954	243,321	.29	1,883	3,611,904	2,041,351
Rainy River and Kenora	7	53,459	18,162	.34	231	381,904	198,133
Patricia	13	1,569,616	372,727	.24	2,490	4,799,957	3,173,160
Eastern Ontario	1	300	60	.20	8	5,052	3,421
Total	83	12,227,706	3,115,975	.25	21,007	40,834,236	20,926,535

(a) In addition, 588 tons tailings were treated.

(b) In addition, 407,823 tons tailings were retreated.

* Includes data for all active properties.

(†) Does not include low-grade discarded by sorting, but includes ore milled or smelted.

Table 64.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1941

Province	Mines		Capital employed as represented by:					
			Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
			\$	\$	\$	\$	\$	\$
Nova Scotia.....	12	11	13,270	335,854	24,307	11,709	55,388	440,528
Quebec.....	93	26	10,505,885	17,625,051	3,172,974	1,624,177	9,813,276	42,741,363
Ontario.....	99	83	37,448,151	78,266,100	11,088,038	5,165,103	37,532,792	169,500,184
Manitoba.....	6	6	206	1,911,523	661,037		1,144,432	3,717,198
Saskatchewan†	3	3		9,698	2,372		5,459	17,529
British Columbia..	137	120	3,935,128	6,504,407	1,886,034	1,521,327	9,082,580	22,929,476
Yukon.....								
Northwest Terri- tories†.....	7	6	1,312,939	1,728,505	509,449	28,333	213,360	3,792,586
Total.....	357	255	53,215,579	106,381,138	17,344,211	8,350,649	57,847,287	243,138,864

†One large producer records its capital under the non-ferrous smelting and refining industry.

Table 65.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada, by Provinces, 1941

Province	Number of employees					Salaries	Wages
	On salary	Wage-earners			Total employees		
		Surface	Under-ground	Mill			
						\$	\$
Nova Scotia.....	33	58	139	31	261	54,761	260,393
Quebec.....	647	1,484	3,794	461	6,386	1,565,670	9,937,179
Ontario.....	1,493	4,880	13,159	1,475	21,007	4,451,187	36,383,046
Manitoba.....	77	262	261	37	637	169,199	1,027,106
Saskatchewan.....	41	49	84	30	204	92,499	331,736
British Columbia.....	367	697	2,100	347	3,511	916,751	5,805,227
Northwest Territories.....	73	230	199	43	545	165,027	991,026
Yukon.....							
Canada.....	2,731	7,660	19,736	2,424	32,551	7,415,094	54,735,716

Table 66.—Wage-Earners, by Months, in the Auriferous Quartz Mining Industry, 1941

Month	Surface	Under-ground	Mill	Total
January.....	7,675	19,745	2,352	29,772
February.....	7,467	19,926	2,372	29,765
March.....	7,516	19,867	2,400	29,783
April.....	7,507	19,708	2,418	29,633
May.....	7,670	19,739	2,460	29,869
June.....	7,766	19,574	2,467	29,807
July.....	7,956	19,866	2,488	30,310
August.....	7,862	19,845	2,451	30,158
September.....	7,913	20,231	2,461	30,605
October.....	7,886	20,514	2,470	30,870
November.....	7,603	19,537	2,427	29,567
December.....	7,140	18,103	2,323	27,566

THE COPPER-GOLD-SILVER MINING INDUSTRY, 1941

The mining of "copper-gold-silver" ores in Canada during 1941 was confined to the provinces of Quebec, Manitoba, Saskatchewan and British Columbia. It is to be noted that in addition to the copper recovered from ores of this type there is a very large and increasing quantity of the metal obtained in the smelting and refining of the copper-nickel ores mined in the Sudbury area of Ontario; increasing quantities of gold and silver are also being extracted from these copper-nickel ores. General statistics relating to labour, etc., in the nickel-copper industry are not included in this report.

Mining operations conducted on Canadian copper-gold-silver deposits during 1941 were reported by 21 firms compared with 25 in 1940. The gross value of crude ore, concentrates, etc., shipped in 1941 from the mines and mills to smelters was estimated at \$64,829,073; the cost of fuel, purchased electricity, process supplies, freight and smelter treatment totalled \$34,608,742 and the net value of shipments was estimated at \$30,220,331.

The gross value of ores shipped by firms which both mine and smelt their own ores is often not reported. This necessitates considerable estimating in determining gross and net values for mine shipments. However, errors or possible incongruities resulting from this are largely compensated for in determining the value added at the smelters and refineries. This added value is credited to the non-ferrous smelting and refining industry and is also included in the total net value of production of the entire Canadian mining industry. This fact should be noted in making any statistical study of the annual production values shown for shipments from copper-gold-silver mines.

The statistics as herein shown under the copper-gold-silver mining industry refer only to mines and mills and are not inclusive of data pertaining to the operation of smelters and refineries. Statistics relating to the reduction of non-ferrous ores are recorded under the non-ferrous smelting and refining industry.

Quebec.—Aldermac Copper Corporation Limited operated both its mine and mill continuously throughout 1941. The capacity of the Aldermac mill was 1,000 tons per twenty-four hours and the Company in 1941 produced both copper and iron pyrites concentrates from 313,329 tons of ore milled. The copper concentrates produced were shipped to the Noranda smelter while the iron pyrites was consigned to various industries in both the United States and Canada. During the year under review there were 10,642 feet of diamond drilling completed at the property.

Waite Amulet Mines Ltd. reported that mining operations were conducted during the entire year in both the Waite Amulet and Amulet Dufault sections of the ore body. Ore from all sections of the deposit was treated in the 1,200 ton Amulet mill. Most of the year's development in the Waite Amulet section was concentrated on the straight zinc orebody which bottoms on the 200 foot level. The main zinc circuit was started in March and first shipment of concentrates was made in April. A 300 ton mill extension for treatment of zinc ore from the Waite mine was erected and put into operation in the latter part of the year. In the Amulet Dufault section, two new stopes were brought into production and a third made ready during the year; the two stopes will make a large tonnage of high zinc, medium copper ore. All shipments of copper concentrates were treated in the Noranda smelter and zinc concentrates were exported to the United States.

The average daily tonnage treated by the Normetal Mining Corporation Ltd. was the highest since operations started. The improvement was due to increased power supply, largely from added Diesel installations. Concentrates were shipped as produced, the copper to Noranda smelter and the zinc to the United States. Following favourable ore disclosures on the lower horizons of the mine, and in view of the necessity for increased production of copper and maintenance of zinc production, preparations were made to increase the capacity of the plant by 150 tons per day. Operating cost in 1941 was \$4.132 per ton milled.

In 1941 Noranda Mines Ltd. completed 5,565 feet of drifting, 3,312 feet of raising and 56,765 feet of exploratory diamond drilling at the Horne mine. The use of diamond drills instead of percussion rock drills for breaking ore in stopes was increased about 32 per cent over that of the previous year, some 363,800 feet of diamond drilling having been done for that purpose. Exploration work carried out thus far below the 2,975 foot level has indicated a large mineralized body containing about 50 per cent pyrite and low values in gold, copper and zinc, extending from about the 1,500 foot level to a depth of at least 5,000 feet.

Manitoba and Saskatchewan.—Approximately 97 per cent of the ore milled during 1941 by Hudson Bay Mining & Smelting Co. Ltd. was derived from underground mining operations and 3 per cent from the open pit, where regular operations were concluded in April. Production of copper, zinc, gold and silver was the highest on record for any year. The tonnage of ore mined from underground in 1941 was increased over any previous year. The tonnage of ore treated in the concentrator was again increased during the year under review. The cyanide plant treated a greater tonnage of flotation tailings than has been treated in any preceding year. There was a considerable increase in the tonnage of zinc concentrates treated in 1941 which resulted in a greater production of slab zinc. The cadmium plant treated all the precipitate from the zinc purification plant and metallic cadmium production was increased. The copper smelter operated to capacity throughout the year.

At Sherridon, in Manitoba, both the mine and mill of Sherritt Gordon Mines Ltd. were in continuous operation during 1941. Copper concentrates were shipped to the Flin Flon smelter of the Hudson Bay Mining & Smelting Co. Ltd. It was reported early in 1942 that negotiations were completed for the production of zinc concentrates. This would be in addition to regular production of copper, with gold and silver as by-products. It would entail no increase in tonnage of ore mined but would mean that the zinc content formerly not concentrated would now be recovered and production of zinc concentrates was expected sometime early in 1942.

British Columbia.—At Copper Mountain, the Granby Consolidated Mining, Smelting and Power Company Ltd. operated its mine and 4,800-ton mill throughout the entire year. Copper concentrates were shipped to the Tacoma smelter, in the State of Washington. During the year the Company completed 27,820 feet of diamond drilling and considerable underground development work.

Britannia Mining & Smelting Co. Limited conducted mining and milling operations during the entire year ending December, 1941. Copper concentrates were exported to the United States and iron pyrites shipped to a Canadian chemical plant. The Company reported that a shortage of skilled labour continued; however, it was possible to continue the operation on a reasonable basis and to accomplish a large amount of exploration and developing work. Encouraging results were obtained at a horizon 400 feet below the main haulage adit. During the year the haulage tunnel was connected with the Victoria shaft, giving it a total length of 20,127 feet. United States currency funds received on sales of Canadian production were sold to the Canadian Foreign Exchange Control Board, the equivalent proceeds in Canadian exchange being deposited with Canadian banks where the funds are available to meet all Canadian currency current earnings, as determined under the regulations of the Exchange Control Board. The capacity of the Britannia mill was reported at approximately 6,000 tons per twenty-four hours.

W. E. McArthur & Son operated the Granby mine in the Greenwood Mining Division during 1941. Copper concentrates obtained from this property were exported to the Tacoma smelter in the State of Washington.

Table 67.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1941 (a)

Province	Mines		Present cash value of the land (excluding minerals)	Present value of buildings, machinery, tools, equipment, etc.	Inventory value of materials on hand, ore in process, fuels, etc.	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	Total
	Operating	Producing						
			\$	\$	\$	\$	\$	\$
Quebec.....	12	5	15,930,629	9,362,516	2,282,449	682,306	8,359,026	36,616,926
Manitoba.....	2	2	3,945,004	6,321,335	1,076,861	989,459	11,086,268	23,418,927
Saskatchewan.....	1	1	2,630,002	3,343,980	496,433	50,674	6,445,418	12,966,507
British Columbia*	7	7	482,057	3,125,445	1,116,831	139,455	3,655,754	8,519,542
Total.....	22	15	22,987,692	22,153,276	4,972,574	1,861,894	29,546,466	81,521,902

* Reports from small leasers shipping from deposits of the Cons. M. & S. Co. of Can. Ltd., in the Rossland district, are compiled as one producer; statistics relating to employment, etc., at these properties are not available.

(a) Not including smelters and refineries.

Table 68.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, by Provinces, 1941*

Province	Number of employees					Salaries	Wages
	On salary	Wage-earners			Total employees		
		Surface	Under ground	Mill			
						\$	\$
Quebec.....	91	520	1,223	233	2,067	262,515	3,307,538
Manitoba.....	155	528	580	128	1,391	444,625	2,308,824
Saskatchewan.....	83	264	192	63	602	229,119	929,141
British Columbia.....	201	448	869	288	1,806	498,452	2,714,809
Canada.....	530	1,760	2,864	712	5,866	1,434,711	9,260,312

* Not including smelters and refineries.

Table 69.—Classification of Wage-Earners Employed in the Copper-Gold-Silver Mining Industry*, 1932-1941

Year	Surface	Under-ground	Mill	Total
1932.....	773	1,719	441	2,933
1933.....	610	1,671	401	2,682
1934.....	747	1,874	344	2,965
1935.....	999	1,721	474	3,194
1936.....	1,323	1,735	354	3,412
1937.....	1,517	2,417	768	4,702
1938.....	1,543	2,891	710	5,144
1939.....	1,763	3,075	749	5,587
1940.....	1,773	3,111	739	5,623
1941.....	1,760	2,864	712	5,336

(*) Smelter employees not included.

Table 70.—Shipments from Copper-Gold-Silver Mines of Canada, 1941

—	Quantity	Value	Total metal content as determined by settlement assay—				
			Gold	Silver	Copper	Sulphur	Zinc
1941	tons	\$	fine oz.	fine oz.	pounds	tons	pounds
11 mines shipped to Canadian plants (a)——							
Ores.....	865,921	8,451,805	159,647	320,994	22,516,954		
(t) Copper concentrates.....	828,622	36,246,634	296,302	4,282,053	240,003,806		3,138,594
Zinc concentrates.....	135,582	3,611,904	6,263	212,115	1,246,645		125,006,638
Iron pyrites concentrates.....	94,818	184,020				45,446	
Slags, residues and gold precipitates.....	189	1,158,147	28,893	113,299	162,553		68,337
10 mines shipped to foreign plants——							
Ores.....	21	234	5	72	865		
Copper concentrates.....	145,549	9,564,563	49,802	430,563	68,313,890		57,515,573
Zinc concentrates.....	51,983	4,515,184	471	47,051	397,450		
Iron pyrites concentrates.....	208,542	1,096,582				103,762	
Total.....	2,331,227	(c) 64,829,073	541,353	5,406,147	332,642,163	149,208	185,729,142
Value of process supplies, etc. (b).....		34,608,742					
Net Value.....		30,220,331					

(t) Includes some cyanide precipitate and slags.

(a) Certain mines operated in the Rossland area by leasers in 1940 and 1941 treated, statistically, as one mine.

(b) Includes freight on ore shipments, smelter charges and fuel and purchased electricity.

(c) Gross value. The values of ores and concentrates shipped from mines to smelters operated by the same companies are often of a nominal or conjectural nature.

Table 71.—Ore Mined and Milled in the Copper-Gold-Silver Mining Industry, in Canada, 1941

	Manitoba and Saskat- chewan	Quebec	British Columbia	Canada
	tons	tons	tons	tons
Ore mined.....	2,726,030	2,916,750	3,620,291	9,263,071
Ore milled.....	2,728,163	2,070,760	3,603,733	8,402,656
Copper concentrates produced.....	452,401	375,718	145,288	973,407
Copper precipitation produced.....			843	843
Pyrite concentrates produced.....		276,411	32,639	309,050
Zinc concentrates produced.....	135,548	52,074		187,622

NOTE.—In addition some cyanide precipitate is produced in the recovery of gold from copper-gold ores; this is smelted in the production of blister or anode copper; also the Manitoba-Saskatchewan boundary passes through the Flin Flon mine.

CHAPTER THREE

THE SILVER MINING INDUSTRY IN CANADA

(a) The Silver-Cobalt Mining Industry; (b) The Silver-Lead-Zinc Mining Industry.

Definition of the Industry.—Silver Mining in Canada is not a distinct mining industry in as much as silver or silver-bearing minerals usually occur in association with other metals of economic value—with lead and zinc; with cobalt, nickel and arsenic; with lode and placer free gold; in copper-gold and nickel-copper ores, and at Great Bear Lake, Northwest Territories with uranium and radium. Silver-lead-zinc mining is a very important industry in British Columbia and, to a lesser extent, in the Yukon Territory. In Eastern Canada, ores containing lead and zinc have been mined in Ontario, Quebec and Nova Scotia.

It is to be noted that, in addition to its recovery from silver-lead ores, zinc is now produced in large quantities from the copper-gold-silver ores of the Flin Flon mine, a property located on the Manitoba-Saskatchewan boundary. Zinc concentrates have been produced in British Columbia from copper-gold-silver ores by the Britannia Mining and Smelting Co. Ltd.; the metal also occurs with copper-gold-silver ores in Quebec and commercial shipments of zinc concentrates made from these particular ores have been made yearly since 1937.

Statistical data contained in this chapter are essentially those pertaining to the mining of silver-cobalt and silver-lead-zinc ores and, to a lesser extent, silver-pitchblende ores.

(a) The Silver-Cobalt Mining Industry

The gross value of shipments made by silver-cobalt mines in 1941 totalled \$788,815 and the net value of sales was estimated at \$662,443. The number of shippers was reported at 24 and ore mined amounted to 11,507 tons.

Most of the cobalt produced in Canada has come from the mining camps at Cobalt, Gowganda, and South Lorrain, in Northern Ontario. In the early years of these camps, it was obtained mainly as a by-product of silver mining, but activity in recent years has been mostly in the production of cobalt ores, with silver as a by-product. Production from the Cobalt and nearby areas has been maintained in recent years by lessees working over old surface dumps and mining narrow surface veins and old underground workings. Cobalt ore was also produced in 1941 from a property at Werner Lake, about 40 miles north of Minaki, Ontario, and 15 miles east of the Ontario-Manitoba boundary. There are some cobalt occurrences in British Columbia, but there is no production as yet from that province.

Cobalt Products, Limited, Cobalt, Ontario, has been operating a concentrating plant since 1938 and is now the principal producer of cobalt ore in Canada. It obtains its ore from various surface dumps and also from the underground workings of a few properties. Its flotation concentrate, which contains from 8 to 12 per cent of cobalt, is sold directly. Included among the more important shipments of cobalt-silver ores in 1941 were those from the Nipissing and O'Brien (Cross Lake lease) mines at Cobalt.

The following review relating to recent developments in the industry was supplied by the Ontario Department of Mines, Toronto, Ont.

"The silver-cobalt industry of Ontario was hard hit in the summer of 1941 when the Temiskaming Testing Laboratory, at Cobalt, was destroyed by fire. It was decided in the fall of the year, as a result of conferences between the Ontario Department of Mines and the Office of the Metals Controller, to rebuild the plant. The Ontario Government voted the amounts necessary to reorganize the laboratory in the old Town Hall building at Cobalt.

"The question of stock-piling domestic cobaltiferous ores by the Canadian Government was settled by the Metals Controller in the spring of 1942. Higher prices to the producers were guaranteed and the tariff was adjusted to the different grades of ores on the basis of cobalt content and the percentage of "foreign" metals contained in the ores. It was understood that the Government would make all its purchases through Deloro Smelting and Refining Company, Limited, but that producers could sell at higher prices to other buyers. The announcement of the new schedule was well received by the cobalt miners and in early June of 1942 there was evidence of much activity in the Cobalt camp.

"Some of the old mines being reopened include: The Red Jacket, the Lumsden, the Columbus, the Giroux, and others. There was some talk of erecting smelters to handle the ore, but nothing positive to that effect was known at the end of June."

The tariff basis for purchase of Canadian cobalt ores, as published by the Metals Controller, May 30, 1942, is as follows:

"To build up a reserve stock of cobalt and at the same time furnish an outlet for Canadian ores or concentrates, Mr. G. C. Bateman, Metals Controller, Department of Munitions and Supply, announces that arrangements have been completed for the purchase of such ores or concentrates containing 8% or higher cobalt element and up to 500 ounces of silver.

"Until further notice, all purchases shall be made through Deloro Smelting and Refining Company Limited, acting as buying agent for the Metals Controller, as and from April 1, 1942 and up to December 31, 1943, all ores or concentrates shipped after April 1, 1942 will be purchased on the following tariff basis but subject to review, should conditions warrant.

"Purchases will be made f.o.b. rail cars, Cobalt, Ontario, or other equalized freight shipping point to destination, specified by the buyer.

PRICES

Cobalt.—For ores or concentrates containing 8% but less than 9% cobalt, the price shall be 88c. per pound contained cobalt.

For ores or concentrates containing 9% but less than 10% cobalt, the price shall be 99c. per pound contained cobalt.

For ores or concentrates containing 10% and over cobalt, the price shall be \$1.10 per pound contained cobalt.

Nickel.—Provided the nickel content is 5% or over, the nickel shall be paid for at the rate of 5.5c. per pound of contained nickel.

Silver.—Provided the silver content exceeds 50 ounces, it will be paid for on the basis of 50% of the content at the rate of 36.3c. per troy ounce up to a maximum of 500 ounces per short ton of ore. When silver exceeds 500 ounces per ton and the cobalt content is 9% or over, the seller may sell same as a cobalt ore or sell separately as a silver ore to other buyers.

Copper Penalty.—When the copper content exceeds 1.5% a penalty of 24.75c. per pound of copper shall apply on the excess copper over 1.5%.

Sampling, Assaying and Weighing.—Ores or concentrates purchased under this tariff shall be paid for on the basis of assay and weight certificates furnished in quintuplicate by either Temiskaming Testing Laboratories, Cobalt, Ontario or Deloro Smelting and Refining Company Limited, Deloro, Ontario, and the cost of such sampling, assaying and weighing shall be for the account of the seller. The buyer reserves the right to have a representative present at the time of sampling and to have an independent assay made at his own expense.

Payments.—Payments shall be made on receipt of shipments at destination specified by the buyer, when fully supported by assays, weight certificates and invoices made out in quintuplicate."

Table 72.—Statistics of the Silver-Cobalt Mines and Mill Operations in Canada, 1939-1941

	1939	1940	1941
Number of mines in operation (*).....	43	44	14
Ore mined..... tons	60,431	43,245	11,507
Ore treated (milled) (a)..... tons	79,164	49,982	38,715
Tailings treated..... tons	145	10,577	.....
Concentrates produced..... tons	2,334	1,627	1,396
Gross value of bullion, ore, concentrates and residues sold..... \$	890,128	866,610	788,815
Cost of freight (b)..... \$	19,054	3,127	7,017
Smelter charges (b)..... \$	49,056	15,484	18,719
Cost of fuel and purchased electricity used (b)..... \$	63,486	10,900	40,875
Cost of process supplies used (b)..... \$	105,500	27,836	59,761
Net value of sales..... \$	653,032	809,263	662,443

(*) All mines located in Northern Ontario and includes properties on which the operations consisted only in salvaging of ore from dumps, etc.

(a) Does not include crude ore shipped.

(b) Data were unobtainable from several small shippers.

Table 73.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1941

Present cash value of the land (excluding minerals).....	\$ 5,641
Present value of buildings, fixtures, machinery, tools and other equipment.....	106,055
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	30,244
Inventory value of finished products on hand.....	34,200
Operating capital (cash, bills and accounts, receivable, prepaid expenses, etc.).....	263,737
Total.....	439,877

Table 74.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1941

	Number	Salaries and wages
		\$
SALARIED EMPLOYEES—		
Total.....	25	60,914
WAGE-EARNERS—		
Surface.....	62	169,070
Underground.....	72	
Mill.....	23	
Total.....	157	169,070
Grand Total.....	182	229,984

Table 75.—Number of Wage-Earners on Payroll or Time Record in the Silver-Cobalt Mining Industry, 1940 and 1941

Month	1940 Total	1941		
		Mine		Mill
		Surface	Under-ground	
January.....	63	51	77	12
February.....	72	51	80	13
March.....	79	54	81	24
April.....	84	54	33	10
May.....	122	82	33	24
June.....	138	82	39	25
July.....	144	71	78	32
August.....	133	75	86	32
September.....	128	69	80	32
October.....	127	63	88	33
November.....	88	54	86	21
December.....	74	45	92	14

(b) The Silver-Lead-Zinc Mining Industry

In 1941 the silver-lead-zinc mining industry of Canada reported 63 operators or firms as being actively engaged in the mining, prospecting or development of silver-lead-zinc deposits and of these operators 61 reported commercial shipments during the year under review.

New Brunswick.—A lead-zinc deposit located on Reserve Brook near the south boundary of Queens County was diamond drilled in 1941. The results of the drilling were disappointing, as little sphalerite and galena were encountered.

Quebec.—Only pumping operations were conducted at the Tetreault mine, located at Montauban les Mines, Portneuf County. In Lemieux township, county of Gaspé North, exploration of lead-zinc deposits was carried on by the Federal Zinc and Lead Company Limited and by Lyall and Beidelman. The old Calumet mine on Calumet Island, in the Ottawa River, was being prepared late in 1941 for active exploration and development in 1942. Golden Manitou Mines Ltd. took over in 1941 part of the holdings near Val d'Or of Quebec-Manitou Mines Ltd., and started the erection of a 600 ton mill for the production of zinc and copper concentrates. A 300 ton mill extension for treatment of zinc ore from the Waite mine was erected and put into operation in the latter part of the year; the main zinc circuit of the Waite Amulet mill was started in March and the first shipment of concentrates was made in April; the zinc-bearing mineral in the

lower "A" orebody is low in zinc and high in iron content and was therefore difficult to concentrate to a commercial grade. Normetal Mining Corporation Ltd. reported that all zinc concentrates produced in 1941 were shipped, but that due to crowding tonnage through the mill, both copper and zinc concentrates produced were slightly lower in grade than the previous year, but recoveries were approximately the same.

Ontario.—In the township of Hess, district of Sudbury, mining and milling operations were conducted from August 1 to the close of the year by the Lake Geneva Mining Co. Limited. Lead and zinc concentrates produced were exported to the United States. In its annual report for 1941, Ventures Ltd. reported under Ontario Pyrites Ltd.: "During the year your company and Sudbury Basin Mines Ltd. completed the purchase of the Errington mine and the lands formerly owned by the Treadwell-Yukon Corporation in the Vermilion Lake area near Chelmsford. If wartime conditions justify the active underground development of these properties, and a new company be formed for that purpose, the holdings of Ventures and Sudbury Basin jointly will amount to almost 80 per cent of the stock issued for properties."

Manitoba.—Sherritt-Gordon Mines Limited announced that in the east mine, during the last few months of the year, a start was made on the development of the zinc ore reserve. It was proposed to have this reserve ready for mining by the time the mill is equipped for zinc concentrate production. Towards the end of 1941 a contract satisfactory to the company, for the sale of zinc concentrates, was made with the Metals Reserve Company in Washington.

The Hudson Bay Mining and Smelting Co. Ltd. reported that there was a considerable increase in the tonnage of zinc concentrates treated in 1941 which resulted in a greater production of slab zinc. The average zinc content per ton of zinc concentrates treated was lower, but the average percentage of recovery was considerably higher; a small pilot mill was built to test a treatment process for the zinc plant residue and its operation was started in November.

British Columbia.—In 1941, as for many years past, the Consolidated Mining and Smelting Company of Canada Limited was the largest single producer of silver-lead-zinc ores in the British Commonwealth of Nations. The noted Sullivan mine of this Company, located at Kimberley, was in continuous operation throughout the year. The Company reported that ore development has kept ahead of production; throughout the year an attempt was made to increase the zinc-to-lead ratio in the ore extracted, with the result that the ore mined in 1941 contained 10.07 per cent lead and 7.24 per cent zinc against 10.2 per cent lead and 6.59 per cent zinc in 1940. The tonnage of lead produced in the Trail smelter was substantially the same as in the previous year; the refinery tonnage was an all-time record in both silver and lead; the zinc plant tonnage was also an all-time record.

Mining and milling operations were carried on during 1941 by Base Metals Mining Corp. Ltd. at its Monarch and Kicking Horse mines located at Field. Lead and zinc concentrates produced by the company were exported to the United States. The 1941 annual report of the Mining Corporation of Canada Ltd. stated that it was impossible to estimate how long operations can continue at Field; at no time is there more than a few months' ore ahead, although there is an additional tonnage of low-grade material which cannot be treated at present, as its treatment, at existing prices, would entail a loss. It was later reported that improved prices have relieved this situation.

At Silverton the Western Exploration Company's mine, the Standard, was in continuous production in 1941; lead and zinc concentrates were treated in United States smelters. Zinc concentrates were also exported to the United States by Zincton Mines Ltd.; the property (Lucky Jim) of this company, located in the Slocan district, was active from April 1. The Highland-Bell Limited conducted mining operations at Wallace Mountain in the Greenwood District and shipped lead ore to the Trail smelter; silver-lead-zinc ores were also shipped to this smelter from the Providence mine and various other properties located in the Slocan, Greenwood, Nelson and other mining divisions.

Yukon.—Lead concentrates were produced and exported to the United States by the Treadwell Yukon Corporation Ltd. Mining and milling operations of this company were conducted at the Calumet and Elsa group of Wernecke Mines—Galena Hill, in the Mayo mining district. Lead concentrates were also exported from the Mastiff mine by Settlemier and Bermingham and from the same area by Bacon and Beck.

Northwest Territories.—No mining or milling operations of any kind were conducted in 1941 at Port Radium by Eldorado Gold Mines Ltd. The Company, however, shipped some 497 tons of Pitchblende concentrates from stock to its refinery located at Port Hope, Ont.

Following are the maximum prices of lead and zinc (delivered) established by the Ministry of Supply for the British market, in effect since December 18, 1939:—Lead: soft foreign, duty paid, £25 per long ton; soft Empire, £25 per long ton and English refined, £26 10s. 0d. per long ton. Zinc: Foreign (G.o.b.), duty paid, £25 15s. 0d. per long ton; Domestic (G.o.b.) £26 10s. 0d. per long ton; Refined and electrolytic £27 5s. 0d. per long ton and minimum 99·99 per cent £28 15s. 0d. per long ton.

Table 76.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry* in Canada, 1940 and 1941

		Yukon and Northwest Territories	British Columbia, Ontario and Nova Scotia (a) (b)	Canada
1941—				
Ore mined.....	tons	23,419	2,793,555	2,816,974
Ore milled.....	tons	23,245	2,864,502	2,887,747
Concentrates produced—Lead.....	tons	2,185	339,656	341,841
Zinc.....	tons		359,242	359,242
1940—				
Ore mined.....	tons	40,424	2,600,549	2,640,973
Ore milled.....	tons	39,104	2,588,458	2,627,562
Concentrates produced—Lead.....	tons	2,538	333,537	336,075
Zinc.....	tons		297,811	297,811
Pitchblende-silver.....	tons	407		407
Silver-copper.....	tons	11		11

(*) Includes silver-pitchblende ores mines in Northwest Territories.

(a) Includes data relating to 1 property in Ontario in 1940 and 1941.

(b) No ore mined or milled in Nova Scotia in 1940 or 1941; includes 1 property in Nova Scotia in 1940 only.

Table 77.—Destination of Shipments from Silver-Lead-Zinc Mines of Canada, 1941

	Tons Shipped	Gross value at shipping point	Total metal content as determined by settlement assay			
			Gold fine oz.	Silver fine oz.	Lead pounds	Zinc pounds
		\$				
To Canadian smelters—						
Lead ore.....	10,787	548,876	1,979	1,268,904	928,670	186,848
Lead concentrates (a).....	302,685	14,579,287	137	7,585,527	424,593,902	23,496,206
Zinc concentrates (*).....	340,729	6,842,517	8	741,355	2,863,558	341,257,800
Dry ore.....	2,580	56,159	1,642	23,370	27,888	36,606
Total.....	656,781	22,026,839	3,766	9,619,156	428,414,018	364,977,460
To Foreign smelters—						
Lead ore.....	409	43,476	17	135,933	450,948	
Lead concentrates.....	6,548	726,840	173	881,541	8,998,160	444,537
Zinc concentrates (*).....	30,359	1,480,822		142,735	196,380	34,551,476
Total.....	37,316	2,251,138	190	1,160,209	9,545,488	34,996,013
Grand Total (gross).....	694,097	24,277,977	3,956	10,779,365	437,959,506	399,973,473
Cost of freight.....		1,584,610				
Cost of fuel and purchased electricity.....		610,168				
Smelter charges.....		740,703				
Cost of process supplies.....		689,284				
Net Value.....		20,653,212				

(*) Does not include any zinc concentrates produced from copper-gold-zinc ores in Quebec, Manitoba, Saskatchewan or British Columbia.

(a) Includes shipments of silver-pitchblende concentrates from Northwest Territories. Information relating to content of pitchblende is not available for publication.

Note.—In addition to the metals contained in shipments listed in Table 14, there are considerable quantities of lead and silver contained in ores shipped from certain gold mines in British Columbia. Cadmium, bismuth, antimony and sulphur are also recovered from these ores (silver-lead-zinc).

Table 78.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1941

Province	Present cash value of land, excluding minerals	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$	\$
Ontario, Quebec, Yukon and N.W.T.*	1,076,764	623,708	286,668	112,426	482,079	2,581,645
British Columbia.....	5,393,162	7,801,300	1,268,985	109,659	502,583	15,135,689
Canada.....	6,469,926	8,425,008	1,555,653	222,085	1,044,662	17,717,334

* Includes data relating to silver and silver-pitchblende mines in the Northwest Territories.

Table 79.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1941

Province	On salary	Mine		Mill	Total	Salaries	Wages
		Surface	Under-ground				
						\$	\$
British Columbia.....	219	304	665	339	1,527	481,329	2,672,211
Ontario, Quebec, Yukon, and N.W.T.†.....	20	58	50	11	139	45,489	253,170
Canada.....	239	362	715	350	1,666	526,818	2,925,381

† Includes data on silver-pitchblende mining operations in the Northwest Territories.

Table 80.—Number of Wage-Earners, by Months, in the Silver-Lead-Zinc Mining Industry, 1940-1941

Month	1940	1941		
		Mine		Mill
		Surface	Under-ground	
January.....	1,222	313	669	302
February.....	1,230	313	653	306
March.....	1,228	307	649	313
April.....	1,302	340	707	351
May.....	1,475	367	729	362
June.....	1,364	390	736	368
July.....	1,397	395	709	365
August.....	1,423	381	726	362
September.....	1,360	393	733	362
October.....	1,364	394	767	372
November.....	1,355	369	755	371
December.....	1,359	346	752	378
Average.....	1,341	362	715	350

ARSENIC

Production of arsenic in Canada during 1941 totalled 3,538,000 pounds valued at \$153,195 compared with 2,093,275 pounds at \$62,798 in the preceding year. During recent years refined arsenic has been produced only by the Deloro Smelting and Refining Company Limited in its plant located at Deloro, Ontario. It was, until 1941, recovered by this company entirely in the treatment of Ontario silver-cobalt ores. Production figures as published represent the element in the form of arsenious acid or white arsenic.

Commercial production of new arsenic in all forms from Canadian ores since 1885 to the end of 1941 amounted to 70,109 short tons valued at \$6,744,854. The largest annual output occurred

in 1918 in which year 3,560 short tons worth \$563,639 were recorded. Arsenic is often a constituent of gold ores and has been commercially recovered from auriferous ores mined in Nova Scotia, Quebec, Ontario and British Columbia. Arsenical gold ores are now being treated at mines located in Northwestern Quebec and in the Thunder Bay District of Ontario.

Baghouses to extract arsenic from the fumes of roasting plants used in the recovery of gold from arsenical concentrate have been installed at the Beattie and O'Brien mines in northwestern Quebec and at the Little Long Lac mine in Ontario. The Bralorne, Hedley, and other mines in British Columbia export arsenical gold concentrates to the United States, but no payment is made for the arsenic. Crude arsenical concentrates from the O'Brien gold mine in Quebec were refined at the Deloro smelter in 1941 and crude arsenical concentrates were exported to the United States and England by Beattie Gold Mines Limited.

Arsenic is used chiefly in insecticides, weed killers, sheep and cattle dip, wood preservatives, glass, pigments, tanning supplies and pharmaceutical preparations. The Bureau of Mines, Ottawa, reports that the use of arsenic to manufacture chemical warfare materials has notably increased its consumption. Data relating to world production of arsenic in 1941 are not available and the nominal price of arsenious oxide in New York was around 3½ cents per pound during the last half of 1941.

Table 81—Production of Arsenic in Canada, 1930-1941

Year	Arsenic in Ore† (As ₂ O ₃)		White Arsenic (As ₂ O ₃)	
	tons	\$	tons	\$
1930.....	1,011 (a)	34,523	1,250	95,004
1931.....			1,787	135,170
1932.....			1,212	98,714
1933.....			734	56,534
1934.....			824	56,412
1935.....			1,279	75,326
1936.....			683	42,491
1937.....			695	41,032
1938.....			1,087	56,538
1939*.....			871	52,257
1940*.....			1,047	62,798
1941**.....			1,769	153,195

† Exported in form of crude ore or crude arsenic. (a) Content of crude ore.

* In addition arsenic was recovered in the treatment of certain Quebec and Ontario gold ores but no commercial production was reported until 1941.

** Includes arsenic recovered at Deloro from crude arsenic received from Quebec gold mines plus the arsenic content of crude arsenic shipped to other than Deloro.

Table 82.—Consumption of Arsenious Oxide and Arsenic Acid in the Manufacture of Canadian Insecticides, 1932-1941

Year	Pounds	\$	Year	Pounds	\$
1932.....	1,721,044	69,250	1937.....	3,296,559	102,651
1933.....	3,116,401	110,011	1938.....	3,029,145	93,873
1934.....	4,709,443	168,185	1939.....	4,287,435	132,584
1935.....	2,736,089	86,983	1940.....	3,607,444*	122,265
1936.....	3,368,956	106,132	1941.....	5,707,499	212,687

* In addition 342,452 pounds of calcium arsenate valued at \$21,671 were used in 1940 and 509,381 pounds at \$34,704 in 1941.

COBALT

The Canadian output of cobalt comes entirely from the silver-cobalt deposits of northern Ontario and includes cobalt recovered and sold in the metallic state, the cobalt content of oxides and salts made and sold and the metal content of cobaltiferous ores exported. Production in 1941 totalled 263,257 pounds valued at \$255,904.

There is at present only one smelter in Canada treating cobalt ores; this is the plant of the Deloro Smelting and Refining Company, Limited, located at Deloro, Ont. This company produced mixed nickel and cobalt oxides at Deloro for the first time in 1910. Continuous operations were conducted by the company throughout 1941 and production included cobalt metal,

cobalt salts, cobalt oxide, arsenic and silver bullion. It is also interesting to note that in 1939, for the first time, cobalt residues were received by the Deloro Smelting and Refining Company, Limited from Africa. These residues are now treated by the Company for the recovery of the cobalt content. Since 1904, the first year for which cobalt production was recorded in Canada, there were produced, to the end of 1941, in all forms, 34,121,271 pounds of Canadian cobalt valued at \$33,412,960. The outbreak of war in Europe in 1939 resulted in both an increased demand and price for cobalt.

As a result of the extensive research, the use of cobalt continues to expand, consequently world production has increased greatly. Cobalt oxide is used in the ceramic industry; cobalt salts in the preparation of driers for use in paints, varnishes, and linoleums and as a catalyst; and cobalt metal in various types of high-grade steels (especially metal-cutting and magnet steels), as a catalyst, and in electroplating.

“Metal and Mineral Markets”—New York—reported prices as follows: July, 1941—Cobalt metal, 97 to 99 per cent \$2.11 per pound for small lots, spot; on lots of 100 pounds or more \$1.50. Cobalt ore, New York, December, 1941—per pound of cobalt: 8 to 9 per cent grade 80 cents; 9 to 10 per cent, 90 cents; 10 to 11 per cent, 90 to 95 cents; 11 to 12 per cent, 95 cents to \$1.00; 12 to 13 per cent, \$1.00 to \$1.05; carload lots f.o.b. Ontario—prices nominal.

About half of the Canadian cobalt production in 1941 was exported to the United States and the remainder was purchased by Deloro Smelting and Refining Company and stockpiled.

In the United States, most of the cobalt produced is obtained from cobalt residues imported from Africa. These are converted to metal at Niagara Falls, N.Y., and to oxide at New Brighton, Wilmington, and Canonsburg, Pennsylvania, and at Cleveland, Ohio.

The total annual world output is estimated to approximate 6,000 metric tons. The greater part of the world's requirements are now supplied from the extensive deposits of the Belgian Congo and Northern Rhodesia, the remainder being contributed mainly by Canada, India, and French Morocco. Other producing countries are Australia, Japan, Germany, and Russia.

Table 83.—Production of Cobalt* in Canada, 1932-1941

Year	Pounds	Year	Pounds
1932.....	490,631	1937.....	507,064
1933.....	466,702	1938.....	459,226
1934.....	594,671	1939.....	732,561
1935.....	681,419	1940.....	794,359
1936.....	887,591	1941.....	263,257

* Includes metal produced in Canada, metal in salts and oxides produced and metal in ores exported.

Table 84.—Cobalt Salts used in the Manufacture of Canadian Pigments and Paints, 1933-1941

Year	Pounds	\$	Year	Pounds	\$
1933.....	10,885	7,463	1938.....	43,703	17,993
1934.....	26,300	14,069	1939.....	52,979	21,638
1935.....	110,419	33,292	1940.....	89,332	28,111
1936.....	170,932	43,230	1941.....	74,445	39,349
1937.....	37,258	17,062			

SILVER

Production of newly mined silver in Canada in 1941 totalled 21,754,408 fine ounces valued at \$8,323,454 compared with 23,833,752 fine ounces at \$9,116,172 in 1940. The average price of the metal in Canadian funds was 38.261 cents per fine ounce in 1941 as against 38.249 cents in 1940. The greatest annual production of silver in Canada was in 1910 in which year an output of 32,869,264 fine ounces was recorded; the highest average yearly price per fine ounce for the

metal in Canada was 111.122 cents in 1919. Production of silver in Canada since 1887, the first year for which data are available, to the close of 1941 totalled 829,253,149 fine ounces valued at \$472,130,763.

Production in ounces during 1941, by provinces and territories, was as follows: Nova Scotia, 673; Quebec, 1,657,082; Ontario, 4,977,476; Manitoba, 966,105; Saskatchewan, 2,047,164; Alberta, 21; British Columbia, 11,233,788; Northwest Territories, 15,327; Yukon, 856,772. Production according to nature of recovery was: in silver-cobalt ores, 2.6 per cent; in base bullion (chiefly silver-lead ores), 45.3 per cent; in lode and placer gold ores, 12.5 per cent; in blister and anode copper, 31.8 per cent, and in exports of matte, copper ores and silver-lead ores, 7.8 per cent.

Complete data relating to world production of silver in 1941 are not yet available. The American Bureau of Metal Statistics estimates production for North America at 169,492,689 ounces; Central America and West Indies, 4,300,000 ounces, and South America, 30,526,750 ounces. The total world production in 1941 was estimated at 273,295,111 ounces.

The following is, in part, from the review of the 1941 Silver Market by Handy and Harman, New York: "The silver picture for 1941 duplicated that of the previous year in general aspect. In London, the low quotations of the year were recorded in January—23 3/16 d. for spot and 23 1/2 d. for forward. The high price was 23 1/2 d. for both spot and forward and was first reached in March. The demand for silver came mostly from industry and, although moderate in amount, it exceeded the available market supplies, and necessitated sales from Indian Government stocks on hand in London.

"In New York the market was quiet and steady with the official quotation at 34 1/2 cents until November 28 when it advanced to 35 1/2 cents, remaining at that figure for the balance of the year. This advance in price was the result of an agreement between the United States and Mexico which provided for the purchase by the Treasury Department of a monthly quota of newly-mined Mexican silver direct from the Mexican Government at the daily price quoted by the Treasury on the day of purchase.

"Because of war conditions, the silver output of Europe, Asia, Africa, and Australia was shut off from the United States. Furthermore, the Treasury Department not only absorbed all newly-mined American silver at 71.11 cents per ounce pursuant to the law of July 6, 1939, but also bought at its day-to-day rate of 35 cents a substantial amount of Canada's production under an agreement with the Canadian Government, plus such amounts of other foreign silver as were offered. As a result, less than half of the world's 1941 silver production was available to industry in the United States and Canada—an industry which, due to war influences, had increased its consumption of silver for the year to the astounding total of 80,000,000 ounces.

"We estimate United States Government acquisitions for 1941 at 139,000,000 ounces, the smallest annual total since the inauguration of the silver buying program.

"The substitution of silver for other metals has occurred both in industry and the arts, the purpose being to conserve scarce war materials such as copper, nickel, aluminium and tin. For example, silver alloys containing only small percentages of scarce metals are being used in place of brass and nickel alloys. Pure silver wire is replacing copper wire in certain electrical appliances and small motors. War requirements are also demanding millions of ounces of silver. This metal is playing an important part in the construction of ships, tanks, trucks, guns, shells, bombs, torpedoes and a wide variety of miscellaneous equipment. Its most extensive use is in the form of brazing alloys, but other compositions are employed in the manufacture of electrical contacts, and pure silver is used for making airplane bearings, photographic film, surgical materials and pharmaceutical products."

In December, 1941 the United States War Department revealed that nine and one-half pounds of silver go into the recoil mechanism of each 115-mm. gun and each 8 inch howitzer turned out by the Ordnance Department. Varying amounts of silver are used in recoil mechanisms of all anti-aircraft guns and all artillery pieces. The silver is formed into cup rings and is used in conjunction with rubber and leather packings to retain oil and gas pressure in the cylinders of the recoil mechanism. The silver is used in the form of an alloy containing 90 per cent silver and 10 per cent copper.

Table 85.—Production of Silver in Canada, by Provinces and by Sources, 1940 and 1941

	1940		1941	
	Quantity	Value	Quantity	Value
	Ounces	\$	Ounces	\$
NOVA SCOTIA—				
In gold bullion..... Total	725	277	673	257
QUEBEC—				
In anode copper.....	1,168,316	446,869	1,467,574	561,508
In gold bullion made and in copper and zinc concentrates exported..	172,134	65,840	(a)189,508	72,508
Total.....	1,340,450	512,709	1,657,082	634,016
ONTARIO—				
In silver bullion made in Canada from cobalt ores.....	1,127,219	431,150	383,720	146,815
In gold bullion.....	572,470	218,964	552,223	211,286
In blister copper.....	2,707,667	1,035,656	2,462,282	942,094
In ores, concentrates, residues, matte, etc., exported.....	1,155,745	442,061	1,579,251	604,237
Total.....	5,563,101	2,127,831	4,977,476	1,904,432
MANITOBA—				
In blister copper.....	1,022,180	390,974	954,781	365,309
In gold bullion (gold mines).....	11,332	4,334	11,324	4,332
Total.....	1,033,512	395,308	966,105	369,641
SASKATCHEWAN—				
In blister copper.....	1,685,393	644,646	2,039,074	780,170
In gold bullion and in crude alluvial gold.....	6,147	2,351	8,090	3,096
Total.....	1,691,540	646,997	2,047,164	783,266
ALBERTA—				
In alluvial gold..... Total	20	8	21	8
BRITISH COLUMBIA—				
In alluvial gold.....	6,939	2,654	7,880	3,015
In gold bullion.....	96,977	37,093	119,756	45,820
In base bullion and in ores, matte, etc., exported.....	11,781,640	4,506,359	11,106,152	4,249,325
Total.....	11,885,556	4,546,106	11,233,788	4,298,160
YUKON—				
In alluvial gold.....	17,979	6,877	15,934	6,097
In silver-lead ores shipped to Smelter.....	(b)2,241,364	857,299	840,838	321,713
Total.....	2,259,343	864,176	856,772	327,810
NORTHWEST TERRITORIES—				
In pitchblende-silver ores shipped to smelters (b) and in gold bullion..... Total	59,505	22,760	15,327	5,864
Canada—Total.....	23,833,752	9,116,172	(c)21,754,408	8,323,454

(a) No copper concentrates in 1941.

(b) No recovery from pitchblende ores in 1941.

(c) Silver in all crude ores, etc., exported totalled 3,711,186 ounces.

NOTE.—For 1940 silver was valued at 38.25 cents per fine ounce, the average price of the metal on the New York market expressed in Canadian funds; for 1941 the corresponding price was 38.261 cents.

Table 86.—Production of Silver in Canada, 1931-1941

Year	Ounces	Cents per ounce	Year	Ounces	Cents per ounce
1931.....	20,562,247	29.87	1937.....	22,977,751	44.88
1932.....	18,347,907	31.67	1938.....	22,219,195	43.48
1933.....	15,187,950	37.83	1939.....	23,163,629	40.49
1934.....	16,415,282	47.46	1940.....	23,853,752	38.25
1935.....	16,618,558	64.70	1941.....	21,754,408	38.26
1936.....	18,334,487	45.13			

Table 87.—Source of Canadian Silver Production, by Percentages, 1940 and 1941

Source	1940	1941
In silver-cobalt ores.....	5.38	2.6
In base bullion (†).....	44.39 (*)	45.3
In gold ores (bullion and placer).....	3.60	4.1
In blister and anode copper.....	27.62	31.8
In matte, copper ores and silver-lead ores, etc., exported (other than silver-cobalt ores).....	19.01	16.2
	100.0	100.0

(†) Chiefly from silver-lead ores.

(*) Includes silver recovered in Canada from pitchblende-silver ores.

Table 88.—Silver Consumed in Specified Canadian Industries, 1940 and 1941

	1940		1941	
	Fine oz.	Value	Fine oz.	Value
		\$		\$
Scientific equipment.....	612,198	244,569	690,516	268,349
Fountain pens and pencils.....		680,650		1,144,409
Jewellery and silverware (fine silver).....		765,067		646,528
Jewellery and silverware (silver alloys).....	44,973	17,821	90,203	35,912
Medicinal and pharmaceutical preparations (bullion).....	7,943	3,177	10,928	4,370
Miscellaneous chemicals.....				

(a) Consumed largely in the manufacture of photographic film.

Table 89.—World's Monetary Stocks of Silver at the Close of 1939 and 1940

(Supplied by United States Mint and subject to revision)
(Stated in United States money, 000's omitted)

Country	1939		1940	
	Silver stock in banks and treasuries (*)	Per capita	Silver stock in banks and treasuries (*)	Per capita
	\$	\$ cts.	\$	\$ cts.
United States (including Hawaii, Alaska and Porto Rico).....	2,860,082	21.59	3,023,005	22.82
Canada (1).....	28,245	2.54	33,586	2.94
Mexico (10).....	55,718	2.91		
Cuba (2) (3).....	77,440	18.85	80,520	19.17
Chile (2) (4).....	412	0.09		
Colombia.....	9,483	1.09	9,480	1.09
Peru.....	4,620	0.71	3,766	0.54
Venezuela (4).....	15,225	4.44	28,203	8.23
Uruguay.....	1,828	0.89	4,435	2.12
Belgium.....	7,070	0.85	7,070	0.84
France (3) (4).....	(11) 16,088	0.38	11,148	0.27
Germany (10).....	549,939	8.14	(15) 700,635	10.37
Bulgaria (2) (12).....	22,510	3.61	22,117	3.33
Hungary.....	4,614	0.51	(3) 4,614	0.51
Lithuania.....	6,681	2.62		
Great Britain.....			38	
Greece.....	1,098	0.15	(3) 1,098	0.16
Eire (8).....	6,989	2.36	(3) 6,989	2.36
Latvia (4).....	1,111	0.56		
Netherlands.....	5,842	0.68	9,617	1.11
Norway.....	5,664			
Rumania (2) (3).....	15,926	0.81	134,532	6.85
Switzerland (3).....	(13) 574		574	0.14
Sweden (4).....	217			
Yugoslavia (3).....	22,329	1.45	4,596	0.30
British Malaya.....	12,981	2.15	10,352	1.71
Indo-China-French.....	5,054	0.22	4,750	0.21
Iran (Persia) (4) (5).....	27,090	2.26	21,004	1.75
Palestine.....	5,541	3.95	(3) 5,541	3.95
Syria.....	(14) 10	(14)		
British West Africa (Gambia, Gold Coast, Nigeria, Sierra Leone).....	10		4,194	0.27
Nyasaland.....	4,342	2.65	2,512	1.50
Rhodesia, Southern (4).....	382	0.30	382	0.30
New Zealand (5).....	7,555	4.72	2,370	1.48
Ceylon.....	8,334	1.44		
India—British (4).....	192,793	0.57	89,635	0.27
Morocco.....	2,752	0.44	2,752	0.44
Netherlands East Indies (10).....	49,192	0.76	(3) 49,192	0.76
Philippine Islands (7) (10).....	18,973	1.45	18,897	1.44
Thailand (Siam) (10).....	6,705	0.46		
Egypt.....	(3) 16,376	1.03	21,508	1.23
Kenya, Uganda, Tanganyika and Zanzibar (9).....	15,033	1.21	(3) 15,033	1.21
Sudan—Anglo-Egyptian.....	(12) 7,503	1.26	(3) 7,503	1.26
Union of South Africa.....	(4) 4,441	0.45	(16) 629	0.06
Other countries.....	17,096		30,468	
Total	4,121,858	2.02	4,372,745	2.15

(*) Monetary silver stock in government treasuries, in banks, and when data available, in circulation. United States equivalent of reported face value at exchange rates.

(1) Net issues of silver coin. (2) Includes base metal coin. (3) Prior year's figures. (4) Silver in circulation not included. (5) As of November 21, 1939. (6) Australian coins and notes are the circulating media. (7) Silver converted to United States equivalent at legal rate. (8) Exclusive of British coins and currency which still circulate in the Irish Free State. (9) On June 30, 1939. (10) Includes silver bullion. (11) On December 7, 1939. (12) At average exchange rate for 1939. (13) Silver coins in central banks only. (14) Data not available. (15) Includes bullion. (16) Subsidiary coin only held by the South African Reserve Bank.

LEAD AND ZINC

The mines of British Columbia account for a large part of Canada's lead and zinc output, the Sullivan mine owned by the Consolidated Mining & Smelting Company Ltd. being by far the largest producer.

The Mining Journal, London, reviews lead and zinc in 1941, in part, as follows:—

Lead.—"The capture of Trepca has given the Axis an important asset, though operations are probably curtailed at present by the resistance of patriot forces. Pre-war output was increasing owing to the higher lead content of the ore at depth and was running about 76,000 tons (metric) per annum of 79 per cent concentrates. The Axis lead position is far less satisfactory than in the case of zinc: Italy for one thing is a liability (apart from an appreciable tonnage of ore she imported 9,000 to 10,000 tons of pig lead before the war). In Japan also the position must be quite serious. Pre-war import figures are not available, but are believed to have been of the order of 100,000 tons per annum and though some stocks may have been built up, these are certainly not large. Imports came principally from Canada, Burma and the U.S.A., and although output in Korea was increasing, it is difficult to see where Japan can possibly obtain supplies now. As against all this, lead is not of anything like the same importance to the war effort of either side as in the last war when such enormous quantities of shrapnel were used, and it is probable that curtailment of peace-time uses, in particular of pipe and sheet in the building industry and to a lesser extent of paints, can release sufficient for most war-time purposes. Nevertheless, efforts to increase output are everywhere apparent."

Effective January 13, 1942, the price of common lead in the United States advanced to 6.50 cents New York, and 6.35 cents St. Louis. This marks the first revision in the lead quotation since March 26, 1941 on which date the price was established at 5.85 cents New York.

Zinc.—"The Axis powers, never very short of zinc, have improved their position by acquisition of Trepca (pre-war output about 35,000 tons (metric) per annum metal content of concentrates). The company themselves announced that the mines had fallen into enemy hands undamaged. Laurium, in Greece, which has also fallen into their hands, is less important. Pre-war output was about 11,000 tons metric, of 46 per cent concentrate, say 5,000 tons of metal. Outokumpu, in Finland, entered the field of zinc concentrate producers in 1939 with an output of 3,336 tons, metric, and it is believed that a considerably larger tonnage was produced in 1940 and 1941. It was originally intended to instal an electrolytic plant, but so far as is known this was not proceeded with and the concentrates are exported presumably now to Germany. Boliden in Sweden is also believed to have greatly increased zinc and lead ore production.

"There is very little news of Italy who, however, probably continues to be self-sufficient in zinc without much to spare. Japan is, of course, a considerable importer despite the increasing home output. Metal production of zinc before the war was of the order of 50,000 tons per annum, while metal in domestic ore did not amount to more than half and there was also a considerable import of metal. She has now, of course, got the Indo-China output of somewhat over 4,000 tons per annum.

"The British position is probably quite satisfactory (March, 1942). The falling off in demand for galvanized sheets may have even caused decline in total consumption despite the greatly increased brass requirements for war uses. The Japanese conquest of Burma—pre-war output around 55,000 tons (metal content) of concentrates—is serious, but even the loss of this tonnage is not catastrophic as long as shipping routes from Australia remain open.

"The United States position in 1941 was more difficult. Spelter was the first metal to threaten shortage in the U.S.A., and therefore its conservation and the stimulation of output and imports first received attention. An emergency zinc pool was announced in July, 1941. Producers of metallic zinc had to set aside an amount equal to 27 per cent of their June production (giving about 19,000 short tons) so that allocations could be made to emergency needs whenever necessary. Australia, Belgian Congo and Bolivia also made their appearance in the United States import returns for ore and concentrates in January-June, 1941, and imports from Peru were at a much higher level than in the first half of 1940."

In the United States regulations under which the Metal Reserve Co. will pay a premium on extra production of copper, lead and zinc were announced on February 9, 1942; quotas are to be

established on the basis of mines or groups of mines by a joint committee composed of officials of W.P.B. and O.P.A. Premium prices apply to all over-quota production after February 1, 1942, regardless of the time when tonnage quotas are announced. Five quota classes are provided for in the plan: (1) Zero quotas, to apply to any property which had no production or produced less than 200 tons of any metal during 1941, (2) Intermediate quotas, for any property which produced more than 200 tons of any metal but less than 600 tons, (3) 100 per cent quotas, for any property which produced more than 600 tons of any metal, (4) Special quotas to apply on less than 100 per cent of 1941 monthly rate of production, (5) Special quotas, for excess of 100 per cent, covering production which can be reasonably expected from certain properties at the established ceiling prices for copper, lead and zinc. Companies that own two or more mines must account for any material decrease below quota of any one property. To obtain the higher prices on metals eligible for sale to Metals Reserve, each producer will have to furnish a sworn affidavit, following the end of each month, showing his total production, his monthly quota, and the amount of his excess output.

In regard to the principal base metals—aluminium, nickel, copper, zinc and lead, Canada is in a position of being a large producer, far in excess of domestic requirements, and a large exporter. In the case of copper and zinc, all tonnages in excess of domestic requirements are under sale contract to the United Kingdom.

In Canada the domestic use of aluminium, nickel, zinc, magnesium, tin, copper and brass have been restricted. All non-ferrous metals and common metal alloys, either in ingot or semi-fabricated, form, as well as industrial minerals, require export permits which must be approved by the Canadian Metals Controller. Curtailment of domestic consumption of zinc in Canada commenced in May, 1941.

In the United States the division of industry operations W.P.B. on May 1, 1942, issued General Preference Order M-11, together with amendments, placing zinc under full allocation, effective June 1. Producers of zinc, of all grades, will not be permitted to ship zinc except on presentation by the customer of an allocation certificate issued by the Director of Industry Operations. Zinc produced from foreign ores in bond may be re-exported provided an export licence has been issued by the office of Export Control, Board of Economic Warfare. Zinc oxide and zinc dust distribution will continue as in the past, a certain quantity being set aside from time to time for emergency needs.

LEAD

Table 90.—Production (b) of New Lead in Canada, 1925-1941

Year	Pounds	\$	Price per pound (Canadian funds)
			cts.
1925 (*)	253,590,578	23,127,460	9.120
1926	283,801,265	19,240,661	6.751
1927	311,423,161	16,477,139	5.256
1928	337,946,688	15,553,231	4.576
1929	326,522,556	16,544,248	5.054
1930	332,894,183	13,102,635	3.927
1931	267,342,482	7,260,133	2.710
1932	255,947,378	5,409,704	2.114
1933	266,475,191	6,372,998	2.392
1934	346,275,576	8,436,658	2.436
1935	339,105,079	10,624,772	3.133
1936	383,180,909	14,993,869	3.913
1937	411,999,484	21,053,173	5.110
1938	418,927,660	14,098,941	3.344
1939	388,569,550	12,313,768	3.169
1940 (a)	471,850,256	15,863,605	3.362
1941	460,167,005	15,470,815	3.362

(*) Year of maximum value of Canadian lead production.

(a) Year of maximum output of Canadian lead.

(b) Primary lead in base bullion produced plus lead in all kinds of ores exported.

Production of lead from all types of Canadian ores from 1887 to 1941 inclusive totalled 7,306,138,058 pounds valued at \$320,838,852.

Table 91.—Production of Refined Lead* in Canada, 1931-1941

Year	Pounds	Year	Pounds
1931.....	278,448,457	1937.....	399,394,939
1932.....	253,136,522	1938.....	409,763,914
1933.....	254,565,861	1939.....	381,137,424
1934.....	314,457,735	1940.....	440,175,353
1935.....	327,515,277	1941.....	456,054,164
1936.....	363,449,490		

(*) Primary lead only from 1934 to 1941 inclusive.

Table 92.—Available Statistics on the Consumption of Lead in Specified Canadian Manufacturing Industries, 1940 and 1941

Industries	Items Used	1940	1941
		Pounds	Pounds
Brass and copper products.....	Pig lead.....	884,114	1,459,661
	Scrap and other lead.....	310,747	748,746
Paints and pigments.....	Pig lead (*).....	14,518,428	20,032,829
White metal alloys.....	Pig lead.....	20,020,978	39,903,256
	Scrap lead.....	27,653,992	25,132,310
Electrical apparatus.....	Pig lead.....	30,433,616	37,433,241
	Scrap lead.....	222,300	207,713
	Other.....	2,727,291	Not available
Iron and steel.....	Lead.....	2,257,375	2,526,060
Explosives.....	Pig lead.....	649,282	†8,810,880
Grand Total.....		99,678,126	

(*) Some products, such as lead oxides made from pig lead by the paints and pigments industry, are sold to other industries for the manufacture of such products as storage batteries.

† In 1941 includes explosives, ammunition and fireworks.

Complete data pertaining to world lead production have not been available since the commencement of the war and the American Bureau of Metal Statistics comments as follows:

"The probability is that the world's production of lead in 1939, 1940 and 1941 as compared with 1938, which is the last year for which complete statistics are available, has not shown any great increases."

ZINC

Table 93.—Production* of Zinc from Canadian Ores, 1929-1941

Year	Pounds	\$	Price per pound (Canadian funds)
			cts.
1929.....	197,267,037	10,626,778	5-39
1930.....	267,643,505	9,635,166	3-60
1931.....	237,245,451	6,059,249	2-55
1932.....	172,283,558	4,144,454	2-41
1933.....	199,131,984	6,393,132	3-21
1934.....	298,579,633	9,087,571	3-04
1935.....	320,649,859	9,936,908	3-10
1936.....	333,182,736	11,045,007	3-31
1937 (b).....	370,337,539	18,153,949	4-90
1938.....	381,596,588	11,723,698	3-07
1939.....	394,533,860	12,108,244	3-07
1940.....	424,028,892	14,463,624	3-411
1941 (a).....	512,381,636	17,477,337	3-411

(*) Includes all refined zinc and zinc in all ores, etc., exported.

(a) Year of maximum Canadian zinc production.

(b) Year of highest annual value.

Table 94.—Refined New Zinc Produced in Canada*, 1931-1941

Year	Short tons	Year	Short tons
1931.....	118,622	1937.....	158,542
1932.....	86,141	1938.....	171,932
1933.....	91,946	1939.....	175,641
1934.....	134,917	1940.....	185,722
1935.....	149,523	1941.....	213,608
1936.....	151,103		

* From all sources.

Table 95.—Available Statistics on the Consumption of Zinc in Specified Canadian Manufacturing Industries, 1940 and 1941

Industry	Items Used	1940	1941
		Pounds	Pounds
Brass and copper products.....	{ Other zinc.....	413,726	420,576
	{ Zinc ingots and slabs.....	16,850,907	50,061,499
White metal alloys.....	{ Zinc scrap.....	108,155	76,044
	{ Zinc spelter.....	6,127,394	17,049,480
Electrical apparatus.....	{ Zinc scrap.....	1,428,594	1,028,061
	{ Zinc ingots and bars.....	1,605,305	2,830,304
Acids, alkalies and salts.....	{ Zinc sheets.....	2,234,459	1,664,145
Iron and steel.....	{ Zinc metal.....	8,346,576	12,896,774
Miscellaneous chemicals.....	{ Zinc.....	40,908,539	49,327,893
	{ Zinc sheets and spelter.....	227,796	149,619
Grand Total.....		78,251,451	135,504,395

CHAPTER FOUR

THE NICKEL-COPPER INDUSTRY IN CANADA

1. Definition of the Industry.
2. General Review.
3. Commodity statistics, including tables showing production, prices, etc., for nickel, copper and metals of the platinum group.

1. Definition of the Industry

The nickel-copper industry in Canada includes the mining, smelting and, to a certain extent, the refining of the nickel-copper ores of the Sudbury district in the province of Ontario. Smelting and copper refining operations are carried on in close proximity to the mines; nickel refining is conducted at Port Colborne, Ontario. Matte is exported for treatment in plants at Huntington, West Virginia, U.S.A., and Clydach, Wales; during recent years matte was also exported to Norway, however, exports to that country ceased after its invasion by Germany in 1940.

As thus described, the industry in Canada constitutes the national source of nickel, most of the platinum group metals and a large part of the Canadian copper production. Gold, silver, tellurium and selenium in increasing quantities are also recovered from these ores.

Mines in the copper-gold-silver group also contribute largely to the total Dominion copper output; ores from these properties contain, in the aggregate, about 11 per cent of the annual gold production. The activities of the copper-gold mines are reviewed in the chapter on the gold mining industry. Production statistics on nickel, copper and the metals of the platinum group are given in this chapter.

2. Review

Statistical data employed by the Bureau of Statistics in its survey of the Canadian nickel-copper mining, smelting and refining industry include those pertaining to the mining and smelting of nickel-copper ores together with statistics relating to the recovery and refining of the economic constituents of such ores—including nickel, copper, platinum metals, gold, silver, selenium, tellurium and sulphur.

The industry, as thus defined, attained an estimated gross production of \$117,287,713 in 1941 compared with the previous high record output of \$103,109,213 in 1940. More nickel was recovered in 1941 than in any other previous year, a fact which reflected an intensified and successful effort to increase the output of a metal so essential in the manufacture of armour plate and other war materials.

Almost the entire production of Canadian nickel in 1941 originated, as in previous years, in the nickel-copper ores of the Sudbury district, Ontario, and represented the recovery of the metal in the refined state, in oxides and salts, and in matte exported. In addition to the nickel obtained from the Sudbury ores, there is a relatively small quantity of the metal recovered annually in the treatment of silver-cobalt ores from the Cobalt district of Northern Ontario.

Copper recovered from nickel-copper ores in 1941 represented 51.8 per cent of the total quantity of new copper produced from all sources in the Dominion during the year under review. The nickel-bearing deposits of the Sudbury area also contain relatively high values in platinum metals which are recovered in refining operations.

In addition to production of nickel, copper, and the platinum metals, there is an important recovery from these ores of the associated metals—silver, gold, selenium and tellurium; sulphur for the manufacture of sulphuric acid is also salvaged in the gaseous state from waste smelter gases. Silver recovered from nickel-copper ores in 1941 comprised 11.3 per cent of the total

quantity produced from all primary sources in the Dominion, and the quantity of gold obtained from these ores during the same period exceeded the entire 1941 gold production of Yukon Territory. The nickel-copper deposits of the Sudbury area are now considered the world's chief single source of the platinum metals.

Two companies operated both mines and metallurgical plants in the Sudbury area in 1941. The International Nickel Company of Canada, Limited, conducts smelting operations at Copper Cliff and Coniston, Ont., while the Falconbridge Nickel Mines, Ltd., smelt their ores at the Falconbridge mine located a few miles east of the town of Sudbury. This last named company treated their matte in a refinery located at Kristiansand, Norway, until the invasion of that country by Germany in 1940. Matte produced by the Falconbridge Nickel Mines Ltd. is now treated in the Canadian plants of the International Nickel Company of Canada, Limited.

The relatively small amount of nickel oxide produced at Deloro, Ont. is recovered from silver-cobalt-nickel-arsenic ores mined in Northern Ontario. Smelter matte made by the International Nickel Company of Canada, Limited is treated in plants located at Clydach, Wales; Huntington, West Virginia, and at Port Colborne and Copper Cliff, Ont. Most of the converter copper made by the International Nickel Company was electrolytically refined at Copper Cliff in 1941; lesser quantities of anode copper were treated in the United States.

The only other nickel-copper mining company to officially report operations in 1941 was Nickel Offsets Limited. This company conducted surface and underground development work on deposits located on lot 6, Concession 4, Township of Foy, Sudbury district, Ontario.

Capital employed in Canada by the nickel-copper mining, smelting and refining industry in 1941 totalled \$140,844,747; employees numbered 12,759 and \$25,270,497 were distributed as salaries and wages. Fuel and electricity used were valued at \$10,213,183 and the cost of chemicals, explosives and other process supplies consumed amounted to \$13,991,741.

The annual report of the International Nickel Company of Canada, Limited, for 1941, contained the following:

"Our company has now completed its second year under the war-time conditions. Its many activities are all under strict control by Governments of Canada, Great Britain and the United States. Production, distribution and financial operations are so organized that the company as a vital industrial unit is rendering its maximum effort towards winning the war.

"Nickel, copper and platinum metals are being used in quantities far in excess of any demand experienced in the past. Our metals are essential in the war program and today almost our entire production is used in making equipment for the armed forces.

"Production of nickel in 1941 reached an all-time high record and additional works are being constructed which will further increase the output. Our mines, smelters and refineries ran continuously, largely on a 24-hour basis. That no time was lost is a high tribute to the fine spirit of loyalty and cooperation which marks labor relations throughout all of the company's plants.

"The company has under way an extensive expansion program involving the expenditures of approximately \$35,000,000. The nickel supply is being increased so that by 1943 the annual production will be 50,000,000 pounds greater than in 1940. The Canadian Government has entered into an agreement with your company under which \$25,000,000 of capital expenditures for this program, incurred subsequent to July 1, 1941, will be amortized over the five-year period to the end of 1945."

Falconbridge Nickel Mines Limited, in its annual report for 1941, stated:

"The ore dressing plant, mill and smelter have been operating at maximum capacity since the latter part of January, with a minimum of time lost for interruptions and repairs. All production records have been broken, but the overcrowding of mill and smelter has resulted in an appreciable increase in metallurgical losses.

"A considerable construction program, started last summer, is going on and will be finished gradually during the first half of the new year (1942). This includes new equipment in mill, sintering plant and smelter, a new laboratory, new change houses and other minor additions and improvements. The Kristiansand plant continues to be—as you know—under control of the German forces, but in charge of our own Norwegian staff, so that its care is in good hands, unless or until a change in the German situation takes place.

"Anticipating the increased drafts to be made on available ore reserves by demands for extra production, an increased program for development and diamond-drilling exploration was initiated early in the year. Its results have been gratifying, since not only do the figures of reserves in our main operating Falconbridge mine show increase over extraction, but exploration has brought over-all reserve figures to the largest in the company's history, with the grade of this reserve comparing favourably with recent years."

Complete data relating to world nickel production are not available since 1939. It was reported in March, 1942 that Nicaro Nickel Company, a subsidiary of Freeport Sulphur Co., would erect a \$20,000,000 plant in Cuba to recover nickel from low-grade ore deposits. Funds for the project have been advanced by the Defence Plant Corp., and the output of nickel is to be purchased by Metals Reserve Co. A test plant, on the gulf coast of Texas, has been in operation for some time to perfect the process for extracting nickel from the Cuban ore. The deposit of ore, situated on the northeastern end of Cuba, was discovered early in the century, and is described as "enormous".

Table 96.—Principal Statistics of the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1939-1941 (*)

	1939	1940	1941
Number of firms.....	(d) 4	(a) 3	(a) 3
Number of mines.....	7	6	6
Number of smelters.....	3	3	3
Number of copper refineries.....	1	1	1
Number of nickel refineries.....	1	1	1
Capital employed.....	\$ 128,302,729	132,818,804	140,844,747
Number of employees—On salary.....	341	928	963
On wages.....	11,153	11,411	11,796
Total.....	11,494	12,339	12,759
Salaries and wages—Salaries.....	\$ 1,195,565	2,623,307	2,831,984
Wages.....	\$ 19,362,273	19,945,580	22,438,513
Total.....	\$ 20,557,838	22,568,887	25,270,497
Fuel and purchased electricity used (c).....	\$ 7,437,370	9,048,885	10,213,183
Process supplies used (b).....	\$ 12,068,595	13,150,095	13,991,741
Estimated gross value of matte exported and Canadian refinery products.....	\$ 95,714,524	103,109,213	117,287,713
Value of production less items (b) and (c).....	\$ 76,208,559	80,910,233	93,082,789

(*) Does not include data for mines, power plants, etc., operated by subsidiary companies.

(a) All in Ontario.

(d) 3 firms reported as active in Ontario and 1 in British Columbia.

Table 97.—Output from Canadian Nickel-Copper Mines and Smelters, 1939-1941

(Short tons)

	1939	1940	1941
Ore shipped from mines.....	7,850,636	8,356,196	9,969,843
Ore and concentrates treated (*).....	7,839,187	8,342,323	9,974,409
Blister copper produced in Ontario (a).....	155,860	167,908	158,788
Nickel produced in Ontario (b).....	65,883	83,739	97,033
Matte exported (c).....	71,315	58,398	67,904
Nickel content of matte exported.....	47,057	(d) 38,867	(e) 43,955
Copper content of matte exported.....	8,212	5,835	7,735

(*) Represents the tonnage of crude ore smelted together with the tonnage of ore milled.

(a) Copper content.

(b) Includes nickel content of salts and oxides produced.

(c) Less a relatively small tonnage of matte returned annually to Canada for retreatment and in 1940 and 1941 exclusive of anode copper exported.

(d) Includes 17 tons contained in anode copper exported for refining in U.S.A.

Includes 46 tons contained in anode copper exported.

Table 98.—Capital Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1941

	\$
Present cash value of the land (excluding minerals).....	116,773,230
Present value of buildings, fixtures, machinery, tools and other equipment.....	15,644,002
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplied on hand.....	3,429,158
Inventory value of finished products on hand.....	4,998,357
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	140,844,747
Total.....	

Table 99.—Employees, Salaries and Wages, in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, 1941

	On salary		Mine		Mill	Total	Salaries and wages
			Surface	Underground			
	Male	Female					\$
Salaried employees—							
Mine and mill.....	326	4				330	974,387
Smelters and refineries.....	556	77				633	1,857,597
Total	882	81				963	2,831,984
Wage-earners—							
Mine and mill.....			1,126	4,805	229	6,160	12,706,607
Smelters and refineries.....			5,636			5,636	9,731,906
Total			6,762	4,805	229	11,796	22,438,513
Grand Total	882	81	6,762	4,805	229	12,759	25,270,497

Table 100.—Number of Wage-Earners Employed in the Nickel-Copper Mining, Smelting and Refining Industry in Canada, by Months, 1940 and 1941

Month	1940	1941	Month	1940	1941
January.....	11,345	11,428	July.....	11,428	11,877
February.....	11,402	11,575	August.....	11,342	11,998
March.....	11,483	11,580	September.....	11,339	11,996
April.....	11,458	11,554	October.....	11,364	12,076
May.....	11,441	11,581	November.....	11,493	12,137
June.....	11,502	11,521	December.....	11,344	12,048

NICKEL

Production figures include nickel in matte exported from the Canadian smelters valued at 18 cents per pound; refined and electrolytic nickel produced in Canada, valued at the average price received for sales of nickel metal from the refinery during the year, and the nickel equivalent in oxides or salts produced, valued in the aggregate at the price obtained from the sales of oxides or salts.

The following is from a letter written December 18, 1941 by Robert C. Stanley, President of International Nickel Company of Canada Limited to the shareholders of this company:

"World nickel production and consumption in 1941 were at an all-time high. The sharp increase in demand arising from the joint British, Canadian and United States war effort required nickel production far beyond anything experienced in the past.

"The United States consumed over two-thirds of the world's total nickel output in 1941, as contrasted with an average annual consumption of about one-third during recent years. It is estimated that steel mills in the United States are currently consuming approximately 70 per cent of the refined nickel imported into that country. Of the remaining 30 per cent, foundries are

taking 7.3 per cent, brass mills 6.5 per cent, heat resisting and electrical resistance alloys 4.6 per cent, electroplaters 2.5 per cent, and the balance is required for rolled nickel and high nickel alloys and a variety of other products."

Table 101.—Production of Nickel from Canadian Ores, 1932-1941

Year	Pounds of nickel	Value	Year	Pounds of nickel	Value
	*	\$		*	\$
1932.....	30,327,968	7,179,862	1937.....	224,905,046	59,507,176
1933.....	83,264,658	20,130,480	1938.....	210,572,738	53,914,494
1934.....	128,687,340	32,139,425	1939.....	226,105,855	50,920,305
1935.....	138,516,240	35,345,103	1940.....	245,557,871	59,822,591
1936.....	169,739,393	43,876,525	1941.....	282,258,235	68,656,795

(*) Includes a relatively small quantity of nickel recovered annually from silver-cobalt ores. Canadian nickel production comes entirely from Ontario ores with the exception of 1937 when a relatively small tonnage of nickel ore was exported from a property in British Columbia.

COPPER

Production of new copper in all forms in Canada during 1941 totalled 643,316,713 pounds valued at \$64,407,497 compared with 655,593,441 pounds worth \$65,773,061 in 1940. Of the 1941 output, Quebec contributed 143,783,978 pounds; Ontario, 333,829,767 pounds; Manitoba, 67,018,563 pounds; Saskatchewan, 32,324,512 pounds; British Columbia, 66,327,166 pounds and Northwest Territories, 32,727 pounds. Included in the total quantity of the metal produced in 1941 were 561,055,782 pounds contained in blister and anode copper made in Canadian smelters. Exports of the metal in forms other than blister or anode included 66,790,216 pounds in ores and concentrates and 15,470,715 pounds in matte made from nickel-copper ores. The price of copper, in Canadian funds, used in both 1940 and 1941 to evaluate Canadian production was 10.086 cents per pound. This price was established under war-time control. Copper in matte exported was evaluated at 7 cents per pound.

Production of copper in Quebec in 1941 originated in the Horne (Noranda), Normetal, Waite-Amulet and Aldermac mines; the copper ores from these properties were all treated in the Noranda smelter. Of the output in Ontario, 333,046,274 pounds, comprising 51.8 per cent of the entire copper output of the Dominion, were recovered from nickel-copper ores. Production in Manitoba and Saskatchewan represented the metal recovered in the form of blister from ores of the Flin Flon mine treated in the smelter of the Hudson Bay Mining & Smelting Co. Ltd. The greater part of the copper credited to British Columbia in 1941 represented the metal in concentrates exported by the Britannia Mining & Smelting Co., Britannia Beach, and Granby Mining, Smelting & Power Co., Allenby.

Copper was refined electrolytically in 1941 at Copper Cliff, Ont., by the International Nickel Company of Canada Limited and at Montreal East by Canadian Copper Refiners Limited. These refineries operated at capacity throughout the year; in September the British Ministry of Supply renewed for another year International Nickel Company's agreement to deliver the major part of its output of electrolytic copper for war requirements of the United Kingdom and all of the remainder for the Canadian market.

Curtailment in brass and copper were instituted by the Canadian Metals Controller through the surveillance of export licences and through informal understanding with principal producers and fabricators. More formal methods were adopted so that consumption of brass and copper for non-essential purposes would be reduced. Control is being effected through primary fabricators. In Canada there is only one primary fabricator of commercial brass, Anaconda American Brass Company, Limited, and two primary fabricators of copper and wire, Canada Wire & Cable Company and Phillips Electrical Works. In 1940 about 55 per cent of the brass consumed was used for non-war purposes. In 1941, only about 12 per cent of the total found its way into such channels.

Complete and accurate data relating to world production of copper have been unobtainable since the outbreak of war in 1939.

Table 102.—Production (*) of New Copper in Canada, from all Sources, 1930-1941

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1930.....	303,478,356	37,948,359	1936.....	421,027,732	39,514,101
1931.....	292,304,390	24,114,065	1937.....	530,028,615	68,917,219
1932.....	247,679,070	15,294,058	1938.....	571,249,664	56,554,034
1933.....	299,982,448	21,634,853	1939.....	608,825,570	60,934,859
1934.....	364,761,062	26,671,438	1940.....	655,593,441	65,773,061
1935.....	418,997,700	32,311,960	1941.....	643,316,713	64,407,497

* Including copper in ores and matte exported and in blister and anode copper made in Canada.

Table 103.—Production of New Copper in Canada, by Provinces and Sources, 1940 and 1941

	1940		1941	
	Pounds	Value	Pounds	Value
		\$		\$
PRODUCTION—				
By Provinces—				
Nova Scotia.....	134,166,955	13,532,079	143,783,978	14,502,052
Quebec.....	347,931,013	34,742,229	333,829,767	33,192,644
Ontario.....	75,267,937	7,501,524	67,018,563	6,759,492
Manitoba.....	20,484,954	2,066,112	32,324,512	3,260,250
Saskatchewan.....	77,742,582	7,841,117	66,327,166	6,689,758
British Columbia.....			32,727	3,301
Northwest Territories.....				
Total.....	655,593,441	65,773,061	643,316,713	64,407,497
By Sources—				
In blister and anode copper produced.....	565,034,590	56,989,388	561,055,782	56,588,086
In ores, concentrates and copper matte exported (a).....	78,889,101	7,956,755	66,790,216	6,736,461
In nickel copper matte exported.....	11,669,750	826,918	15,470,715	1,082,950
Total.....	655,593,441	65,773,061	643,316,713	64,407,497

(a) Contain a relatively small quantity of copper contained in gold and silver ores shipped to Canadian smelters; no matte exported in 1940 or 1941.

Table 104.—Production (a) of Refined Copper in Canada for Years Specified

Year	Tons	Year	Tons
1916*.....	483	1937.....	215,080
1917.....	3,901	1938.....	227,240
1918.....	3,809	1939.....	231,684
1919.....	3,467	1940.....	261,878
1935.....	173,290	1941.....	278,221
1936.....	191,595		

* First electrolytic copper produced commercially in Canada.
(a) From all sources including scrap.

Table 105.—Available Statistics on the Consumption of Copper in Specified Canadian Industries, 1939, 1940 and 1941

Industry	Item (Used)	1939	1940	1941
Brass and copper products (a).....	Ingots, wire bars, slabs, etc..... lb.	119,161,178	208,302,644	176,679,478
	Scrap..... lb.	3,770,561	5,527,865	12,199,005
	Pipe and tubing..... lb.	75,177	115,778	188,074
	Plates and sheets..... lb.	710,612	570,036	971,838
	Wire..... lb.	310,485	351,269	384,929
	Other..... lb.	112,730	151,187	Not available
White metal Alloys.....	Scrap, all kinds..... lb.	2,411,785	4,098,077	10,200,476
	Copper—ingots and slabs..... lb.	115,851	290,498	590,178
Electrical Apparatus and Supplies...	Castings..... lb.	66,283	136,979	480,687
	Ingots, slabs, wire bars, etc..... lb.	694,178	1,675,341	2,109,395
	Rods..... lb.	29,159,186	50,755,124	61,700,539
	Scrap..... lb.	44,554	93,356	91,333
	Tubing and pipe..... lb.	303,897	452,911	641,402
	Sheets and plates..... lb.	446,535	575,871	846,949
	Wire, bare..... lb.	5,216,630	6,606,363	8,607,762
	Wire, enamelled..... \$	351,172	703,765	902,013
	Wire, other insulated..... \$	939,583	1,232,526	1,577,960
Iron and Steel and Their Products.....	Copper sheets, bars, etc..... lb.	6,842,523	10,841,787	12,015,570

(a) A relatively large part of the copper included under this industry is rolled into wire rods, which are sold to manufacturers of electrical cable duplication to this extent results from the inclusion of these rods in the Electrical Apparatus Industry.

Table 106.—Canadian Copper Ore Reserves as Officially Reported

(American Bureau of Metal Statistics)

	Year	Province	Short tons ore	Average grade	Short tons copper
				%	
Falconbridge (a).....	1940	Ontario.....	7,502,000	0.94	70,500
Granby Consolidated—Allenby.....	1941	British Columbia..	16,707,600	1.32	220,500
Hudson Bay.....	1938	Manitoba.....	27,534,000	2.23	614,000
International Nickel (a).....	1939	Ontario.....	224,594,000		(b)7,214,000
Noranda.....	1939	Quebec.....	29,513,000	2.32	684,700
Normetal.....	1935	Quebec.....	782,600	2.13	16,700
Sheritt Gordon.....	1939	Manitoba.....	4,860,000	2.38	115,700
Waite-Amulet.....	1939	Quebec.....			
Amulet section.....	1940	Quebec.....	270,000	2.70	7,300
Waite section.....		Quebec.....	550,000	4.25	23,400
Britannia.....		British Columbia..		(c)	(c)
Aldermac Mines Ltd....	1938	Quebec.....	1,716,000	2.00	34,300
Amulet Dufault (d).....	1940	Quebec.....	3,260,000	6.30	205,400

(a) Also produces nickel. (b) Copper-nickel content. (c) Data not available.

(d) New company which took over "Lower A" orebody of Waite-Amulet.

METALS OF THE PLATINUM GROUP

The entire output of new metals of this group in 1941 was derived from the nickel-copper ores of the Sudbury district in Ontario, with the exception of 60 ounces of platinum recovered from alluvial deposits in the province of British Columbia.

Production from Ontario ores represented recoveries made from precious metal concentrates shipped by the International Nickel Company of Canada Limited and treated in plants located at Acton, England and Newark, New Jersey, U.S.A.; precious metals contained in matte made at the Falconbridge smelter were recovered in Norway until April, 1940, at which time the refinery of the company was seized by the German army; since then all matte made at the Falconbridge smelter was treated in the plants of the International Nickel Company of Canada Limited and recoveries of such metals were included with those reported by that company.

The 1941 annual report of the International Nickel Company of Canada Ltd. stated:—

"The consumption of platinum metals increased substantially in 1941, chiefly because of war requirements.

"The Company's platinum metals were sold principally in Canada, Great Britain and the United States. Prices for the platinum metals held through the year without important changes except in the case of iridium. Platinum was quoted in the United States at \$36 per ounce, palladium at \$24, rhodium at \$125 and ruthenium at \$35 to \$40. In January, iridium was quoted at \$275 per ounce, but the price declined to \$175 in February and remained at that figure throughout the rest of the year. Your Company's production of iridium is small."

USES OF PLATINUM METALS

Platinum: Alloys of platinum available in wrought and cast forms; used industrially in equipment producing nitric acid, rayon and fibre glass, and for parts of instruments and controllers. Laboratory equipment; dental restorations and jewellery utilize platinum and platinum alloys because of their corrosion resistance, strength and ability to withstand high temperatures.

Palladium: Used for electrical contacts, catalysts and as an alloying element in dental alloys.

Rhodium—Ruthenium—Iridium: Used mainly as alloying elements in platinum alloys. Iridium and ruthenium are important hardening additions for platinum. Rhodium improves performance of platinum catalyst used for oxidation of ammonia at high temperature. Electroplates of pure rhodium are being used increasingly.

Table 107.—Production of Platinum Group Metals in Canada, 1941 and 1940

	Platinum		Palladium, rhodium, iridium, etc.	
	Fine ounces	\$	Fine ounces	\$
1941				
Ontario.....	124,257	4,747,860	97,432	3,396,304
British Columbia.....	60	2,293		
Total.....	124,317	4,750,153	97,432	3,396,304
1940				
Ontario.....	108,464	4,239,424	91,522	3,520,746
British Columbia.....	24	938		
Total.....	108,488	4,240,362	91,522	3,520,746

Table 108.—Production of Metals of the Platinum Group, 1932 - 1941

Year	Platinum				Palladium*	
	Lode		Placer		Fine oz.	\$
	Fine oz.	\$	Fine oz.	\$		
1932.....	27,284	1,097,021	59	2,372	29,727	548,582
1933.....	24,746	856,190	40	1,400	31,009	645,043
1934.....	116,177	4,488,712	53	2,051	83,932	1,699,228
1935.....	105,335	3,444,455	39	1,275	84,772	1,962,937
1936.....	131,551	5,319,922	20	809	103,671	2,483,075
1937.....	139,355	6,751,750	22	1,066	119,820	3,179,782
1938.....	161,310	5,196,279	16	515	130,893	3,677,342
1939.....	148,877	5,221,712	25	877	135,402	4,199,622
1940.....	108,464	4,239,424	24	938	91,522	3,520,746
1941.....	124,257	4,747,860	60	2,293	97,432	3,396,304

* Since 1933 includes other platinum metals, except platinum.

Table 109.—Production of Certain Metals of the Platinum Group, 1926-1932*

Year	Rhodium		Ruthenium		Osmium		Iridium	
	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$	Fine oz.	\$
1926.....	204	9,969	16	791			14	3,252
1927.....	222	6,853	31	1,073			45	4,945
1928.....	895	20,951	561	16,331			342	78,953
1929.....	3,037	151,850	1,376	66,048			497	119,777
1930.....	(a) 4,133	206,650						
1931.....	(a) 7,605	431,457						
1932.....	(a) 7,886	353,308						

(a) Includes rhodium, iridium and ruthenium as other platinum metals.

* Since 1933 these metals are included with palladium as shown in preceding table.

Table 110.—Platinum Consumed in Canadian Jewellery and Silverware Industry, 1932-1941

Year		Value	Year		Value
		\$			\$
1932.....		26,928	1937.....		112,295
1933.....		35,714	1938.....		85,503
1934.....		38,307	1939.....		160,688
1935.....		45,627	1940.....		148,748
1936.....		101,129	1941.....		208,318

Table 111—Platinum Metals Sold in the United States, as Reported by Refiners and Shown by Consuming Industries, 1940

(U.S. Bureau of Mines)
(In Troy ounces)

Industry	Platinum	Palladium	Others	Total
Chemical.....	31,174	1,624	14,593	206,890
Electrical.....	17,543	32,528		
Dental.....	9,859	26,346		
Jewellery.....	51,296	7,624		
Miscellaneous and undistributed.....	13,101	1,197		
Total.....	122,978	69,319	14,593	206,890

CHAPTER FIVE

MISCELLANEOUS METAL MINING INDUSTRIES IN CANADA

Including General Statistics Relating to the Industries in this Group and Commodity Statistics Showing Production by Provinces and Prices on Aluminium, Antimony, Barium, Beryllium, Cadmium, Chromite, Iron Ore, Pig Iron and Ferro-Alloys, Steel and Rolled Products, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Pitchblende, Selenium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium and Zirconium.

1. General Review

Metal-bearing minerals, mined in relatively small quantities by a comparatively few operators, have been grouped by the Dominion Bureau of Statistics for consideration as a single industry. Included with the finally revised statistics relating to the Canadian production of these, are notes and statistical data pertaining to various rare or semi-rare metals or metalliferous ores produced in other countries. Metals or metal-bearing ores produced in Canada during 1941 and classified as miscellaneous include—antimony, bismuth, cadmium, iron ore, mercury, manganese, molybdenite, radium products, selenium, tellurium, tungsten concentrates, titanium ore, tin and magnesium. In addition to particulars relating to these metals or products, this chapter contains notes of a summary nature on beryl and beryllium, lithium, sodium, calcium, aluminium, vanadium and zirconium.

It is to be noted that the majority of the metals listed above as Canadian products and including bismuth, cadmium, selenium, tin and tellurium, represent by-products recovered in the production of lead, zinc or copper and, for this reason, such statistics as relate to their recovery in Canada are included with those of either the silver-lead-zinc mining industry, the copper-gold-silver mining industry, or the non-ferrous smelting and refining industry.

The gross value of production credited to this industry in 1941 totalled \$3,428,886 compared with \$2,029,278 in 1940. Employees numbered 725 in 1941 and salaries and wages paid amounted to \$1,141,244.

ALUMINIUM

The reduction of aluminium ores and the production of primary aluminium in Canada is confined to the province of Quebec. In this province the Aluminum Company of Canada, Limited, operates an ore treatment plant at Arvida and reduction plants at both Arvida and Shawinigan Falls. These three plants were in continuous operation throughout 1941. At the Arvida ore plant concentrates were made from British Guiana bauxite and aluminium ingot was produced in the two reduction works. The Company also operates fabricating plants at Shawinigan Falls, Que., and Toronto, Ont., and a new plant for the production of aluminium products is now operated by the Company at Kingston, Ont. Data relating to the aluminium industry are not included with those recorded in tables of this report. Bauxite from British Guiana, used for the production of aluminium, is washed and dried before being shipped; at Arvida, Que., it is treated by a standard chemical process to remove impurities, and pure aluminium oxide is recovered. Cryolite, necessary in the production of the metal, is largely imported from Greenland; synthetic cryolite is also used in making aluminium. A very large amount of electrical energy is utilized in the production of new aluminium metal from bauxite concentrates. No bauxite ores are mined in Canada and the principal bauxite producing countries are France, Hungary, United States, Yugoslavia, Italy, British Guiana, Dutch Guiana and Russia.

According to W. L. Batt of W.P.B., February 26, 1942, the United States aluminium producing capacity was to be expanded to a scale of about 1,000,000 tons annual production, most of this to be furnished by Alcoa and Reynolds Metal Co.

Data relating to world production of aluminium and bauxite in 1940 and 1941 are not available. A very considerable increase in Canadian aluminium production is planned for the immediate future.

In a paper presented at the American Mining Congress' Annual Metal Mining Congress, Mr. Frank Eichelberger, President, Kalunite, Inc., stated:

"Commercial production of aluminum from alunite will begin in 1942 with an estimated daily capacity of 50 tons of aluminum ingots. What the future holds forth for this process in the production of alumina, is purely one of competitive costs. With final proof of the Kalunite process on a commercial scale, it may be said that the future development of aluminum will only be a function of world conditions for the final barrier, the limitations of ore supply have been removed. The future ore of aluminum will be the vast clay deposits of the world. Alunite (hydrated basic potassium-aluminum sulphate) occurs widely scattered throughout the entire world, but is most generally found in arid or semi-arid regions, although there are many exceptions to this. To mention two, the deposits near Mount Rainier and those on Vancouver Island (Natroalunite)".

Production of bauxite in the United States in 1941 exceeded the previous peak reached in the World War year of 1918 by nearly 50 per cent and surpassed the output of 1940 by 105 per cent, according to preliminary figures compiled by the Bureau of Mines, United States Department of the Interior.

Output in 1941 totalled an estimated 899,500 long tons compared with only 438,913 tons in 1940. Imports of bauxite during the first 9 months of 1941 totalled 749,264 tons, a tonnage considerably greater than ever received during any previous full 12-months period. Domestic production and importations in 1942 are expected to greatly surpass those of 1941. Consumption of bauxite in the United States also broke all records in 1941 and is estimated to have totalled approximately 1,700,000 tons compared with 1,072,000 tons in 1940. It is estimated that the aluminum industry consumed about 70 per cent of this bauxite and the chemical, abrasive (including American-owned plants in Canada), and other industries about 16, 12, and 2 per cent respectively.

Of the estimated 1941 bauxite production (dried bauxite equivalent, based on monthly mine shipments), Arkansas contributed 92 per cent and Alabama, Georgia, and Virginia the remaining 8 per cent. The greatest increase in mine production over that of 1940 was in Arkansas and Alabama. The 1941 production data are based on monthly canvasses conducted by the United States Bureau of Mines for the Office of Production Management, the usual preliminary annual canvass was not made. No reliable figures are available at this time on the value of bauxite shipped. It is probable, however, that the value on all grades of domestic ore shipped in 1941 was more than double that of 1940 (\$2,578,968).

Table 112.—Consumption of Aluminium in Specified Canadian Industries, 1940 and 1941

Industry	1940		1941	
	Pounds	Cost at works	Pounds	Cost at works
		\$		\$
Aluminium products (a).....	37,976,264	8,229,879	41,832,000	8,057,820
White metal alloys.....	2,212,526	537,173	1,754,472	423,519
Electrical apparatus and supplies.....		657,309		925,733
Brass and copper products (b).....	2,464,371	386,569	2,367,307	613,638
Iron and steel products (b) (c).....	4,199,111	1,073,792	4,844,122	1,292,379

(a) Largely for the manufacture of cooking utensils, cable, etc.

* In addition in 1940 there were consumed 3,039,750 pounds of scrap valued at \$369,933 and in 1941 the scrap consumption was 7,352,993 pounds valued at \$653,972.

(b) Includes scrap.

(c) Includes industries manufacturing cooking and heating apparatus, sheet metal products, etc.

ANTIMONY

In 1941 antimony metal was produced in Canada only at Trail, British Columbia, by the Consolidated Mining and Smelting Company of Canada Limited. The metal was recovered from flue dust, a by-product in silver refining. In addition to the production, there were antimony ores shipped in British Columbia by Arthur LeClerc from the Stuart property located at the head of Ferguson Creek and from the Fraser mine near Minto; crude ore from these properties was exported to a smelter in California.

For a number of years prior to 1917, small amounts of refined antimony as well as antimony ore were produced intermittently in the Maritime Provinces.

Antimony deposits have also been worked in the province of Quebec; in Ontario the metal in small quantities has been exported in the form of silver-lead-bismuth bullion made from silver-cobalt ores. No official reports pertaining to antimony mining operations or antimony production in Canada during 1941 were received from any province other than British Columbia.

The market for antimony depends especially upon the demand from automobile manufacturers, as it is used largely in alloys for storage-battery plates, bearing and babbitt metals, solder, rubber goods, paints and fixtures. The use of antimony in the manufacture of chemicals has increased considerably during the last two years. The principal compound is the oxide of antimony, which is employed extensively as a pigment in sanitary enamelware and nitrocellulose enamels. The expansion in the manufacture of munitions of war is also an important factor in the increasing demand for antimony. Since December, 1935, the Chinese antimony trade has been under government control.

Canadian production of antimony in 1941, from all sources, totalled 3,185,077 pounds valued at \$445,911 compared with 2,594,492 pounds worth \$396,468 in 1940 and 1,225,585 pounds at \$151,469 in 1939. Prior to the close of 1938 there had been no commercial production of antimony metal in Canada since 1917, and no by-product output of the metal since 1926, in which year it was reported as contained in silver-lead-bismuth bullion produced from the cobalt-silver ores of Northern Ontario. Complete world data relating to antimony production have not been available since 1937; for that year a world production of approximately 34,502 metric tons of metal was estimated. The world's principal primary producers of the metal have been China, Mexico and Bolivia.

The New York price of antimony (ordinary brand) in 1941 remained fixed at 14 cents a pound. The price for Chinese brand, duty paid, remained at 16 cents throughout the year.

Table 113.—Antimony Produced in Canada, 1937-1941

Year	In ores shipped		Metal produced		Total	
	Pounds	\$	Pounds	\$	Pounds	\$
1937.....	48,163	7,394			48,163	7,394
1938.....	24,560	2,200			24,560	2,200
1939.....	25,405	3,139	1,200,180	148,330	1,225,585	151,469
1940.....	44,700	3,800	2,549,792	392,668	2,594,492	396,468
1941.....	15,292	2,141	3,169,785	443,770	3,185,077	445,911

Table 114.—Antimony Used in Specified Canadian Industries, 1940 and 1941

Industry	1940		1941	
	Pounds	\$	Pounds	\$
White metal alloys—regulus.....	735,051	113,881	1,366,077	197,622
Antimony ore.....	357,579	17,193	11,044	539
Electrical apparatus and supplies.....	166,533	24,918	230,433	33,494

BARIUM

Barium metal is not yet produced commercially in Canada. The Mineral Industry, 1940, refers to barium as follows:

"Barium metal is now produced in the United States, to replace the small amounts formerly imported from France. Scarcity of tin and antimony for babbitt metal may lead to a greater development of lead base bearing metals hardened by the addition of calcium and barium (Frary metal).

"It has been demonstrated that thin films of barium can be used as lubricant for steel balls used in the bearings of rotating anodes in highly evacuated X-ray tubes, where oil can not be used because of its volatility at the temperature to which it is exposed. The barium in the form of a wire coated with iron is assembled in the bearing near the balls, in such a way that at the working temperature of the tube the barium slowly volatilizes, diffusing through the iron coating, and depositing on the surface of the balls. This discovery may possibly lead to other applications to bearings operating at high temperatures."

There have been no recently published price quotations for barium; in 1936 it was available at approximately \$5.00 per pound or less.

BERYLLIUM

A report prepared by the Bureau of Mines, Ottawa, contains the following information relating to beryl:

"Beryl, a silicate of aluminium and beryllium, at present the only commercial source of beryllium, usually contains from 10 to 12 per cent of beryllium oxide which corresponds to 4 to 4.5 per cent of metallic beryllium. It occurs in pegmatite dykes, mainly in the form of disseminated crystals, and the beryl sold is a by-product from the mining of these dykes for their feldspar, lithium minerals, or mica. World output is relatively small and comes mostly from the United States (South Dakota, Colorado, and New England), India, Argentina, Brazil, and South Africa. Known world reserves, however, are believed to be capable of meeting a considerable increase in the demand.

"Known occurrences of beryl in Canada include a deposit in Lyndoch township, Renfrew county, Ontario, and several scattered occurrences in the Pointe du Bois district, southeastern Manitoba.

"Canadian Beryllium Mines and Alloys, Limited, 901 Royal Bank Building, Toronto, has done some surface work on the deposit in Lyndoch township and has stockpiled a few tons of cobbled beryl crystals, but the mine was inactive during most of 1940 and throughout 1941. The pegmatite contains small amounts of columbite and certain other rare-element minerals. Some small shipments of feldspar have been made from the property.

"In Manitoba, beryl occurs mainly as scattered crystals in certain pegmatite bodies that have been worked for either feldspar or lithium minerals in the Winnipeg River and Bird River areas. There has been no production aside from a small amount of clear, glassy material used for cutting into gem stones, for the Winnipeg jewellery trade. Mobirk Beryllium Mining, Limited, Victory Building, Toronto, incorporated in 1940 to develop five groups of claims in the Shatford, Bernie, and Cat Lake areas, reported in December, 1941 that it had placed parties in the field to commence operations. Plans call for the building up of a stock of beryl for the production of beryllium oxide in a plant to be located in Winnipeg.

"Beryl-bearing pegmatites, containing lithium minerals, occur in an area lying about 20 miles northeast of the Yellowknife camp in the Northwest Territories. Occurrences of beryl are also known in the Rainy River and Patricia districts, Ontario, and in Northern Quebec. None of these occurrences, however, is of particular economic interest at present.

"There is no recorded Canadian production of beryl. The only known shipment consisted of about 2 tons, which was made about ten years ago and for experimental purposes only. There are no records of any Canadian imports of beryllium or its compounds.

"There are no figures of world production of beryl. The United States is the chief consumer of beryl for use in the production of beryllium metal and alloys, and of beryllium oxide and other

salts, and the consumption in that country is increasing steadily. The production, although small, is increasing, and sales in 1941 of the metal and of the alloys and compounds are estimated to have exceeded \$1,000,000 in value. Adequate supplies are available in the United States, and part of the imports are doubtless used to build up stocks.

"Argentina and Brazil appear to be the most promising world sources of the mineral. Mines in Cordoba and San Luis provinces, Argentina, shipped 753 tons in 1939 and 520 tons in 1940. Brazil exported 1,472 tons of beryl in 1940, of which 418 tons went to the United States. Under an agreement concluded in 1941, the United States contracted to purchase the entire Brazilian production of beryl for the next two years.

"The potential importance of beryllium-copper alloys for defence purposes has recently aroused considerable interest, and they are already specified for an increasing number of military uses. The alloy is claimed to exhibit remarkable resistance to wear and change in volume when subjected to rubbing loads under heavy pressures, and is used for non-magnetic ball bearings, tappet roller bearings, and bushings. Further recently developed uses are for fuse-springs in shells, and for solderless connectors and spring terminals in the automobile industry. Beryllium-nickel master alloys containing 12.5 per cent beryllium is being sold in powder or ingot form by Metal Hydrides, Incorporated, of Beverly, Massachusetts, a subsidiary of Ventures, Limited.

"Beryllium Corporation of Pennsylvania, Reading, Pennsylvania, and Brush Beryllium Company, 3714 Chester Avenue, Cleveland, Ohio, remain the most important world consumers. Copper-Wilford Beryllium Limited, of Newton Falls, Ohio, and 33rd and Arch Streets, Philadelphia, a company recently formed to engage in the production of light beryllium-aluminium alloys ("Beralite") for aircraft use, advised the Bureau of Mines early in 1941 that it might be in the market for supplies of beryl, and also that it was conducting research on flotation methods of concentrating low-grade beryl ores. A company is reported to have been organized in Argentina to produce mixed beryllium oxide-carbonate as a base material for the extraction of beryllium metal from domestic ores. This product, which is made by a newly-developed (Gourden) process, is stated to be of high purity and to contain 80 per cent of beryllium oxide, the difference being carbon dioxide.

"Nominal quotations for standard beryl in 1941 remained substantially unchanged, at \$30 to \$35 a short ton, f.o.b. mines, \$40 to \$45 at consuming at plant, for 10 to 12 per cent BeO material. The blockade of Germany and Italy, however, diverted South American supplies to the United States, and with the surplus offerings resulting therefrom, sales were as low as \$30 to \$35 a ton ex dock, Atlantic ports. Special, glassy, crystalline beryl, which usually contains more beryllium oxide than normal standard grade and is preferred for ceramic use, commands a premium and sells as high as \$50 a ton f.o.b. shipping point."

Complete allocation control over beryllium in the United States was ordered early in June, 1942 by the Director of Industry Operations, W.P.B. with the issuance of Order M-160.

BISMUTH

Production of bismuth in Canada during 1941 totalled 7,511 pounds valued at \$10,396 compared with 58,529 pounds worth \$81,004 in 1940. Production during the year under review represented a relatively small amount of the metal contained in crude ore exported to the United States from the property of Nicola Goldfields, in British Columbia, together with the metal contained in a silver-lead-bismuth bullion produced by the Deloro Smelting & Refining Co. Limited, Deloro, Ontario from the silver-cobalt ores of Northern Ontario. This base bullion is refined in the United States. The greater part of the Canadian production of bismuth in 1941 originated in the silver-lead ores of British Columbia and the recovery of the metal was made at the Trail smelter of the Consolidated Mining & Smelting Company of Canada Limited.

It is impossible to arrive at any actual figure for the world output of bismuth and according to "The Mineral Industry" the world total in 1940 was probably not far from the 1,500 metric tons estimated for 1939. Peru, Mexico, Roumania, Japan, Bolivia and Australia are among the more important bismuth producing countries. The occupation of Yugoslavia in 1941 gave Germany control of the by-product bismuth from the Trepcas mines.

Bismuth is used mostly in the manufacture of pharmaceutical products. A much larger portion than formerly is now used in the making of so-called fusible or low-melting alloys. Fusible bismuth alloys usually include lead, tin, cadmium, mercury, or antimony. An alloy of bismuth, lead, tin, and antimony has been introduced for use in mounting dies and punches. The Ekko process, for electroforming with iron, has provided an outlet for bismuth in the form of "cerrobase", a nonshrinking bismuth-lead (Bi-Pb) alloy. One application of the Ekko process is the production of dies or molds from which a photographic likeness can be transferred to iron. Although many applications of bismuth, introduced in recent years, have increased the demand for this metal, potential supplies have greatly exceeded the present demand. The war has restricted international trade in bismuth and encouraged the use of substitutes. The demand for bismuth increased considerably during 1941 owing to its greater use in metallurgical and pharmaceutical applications. Alloys containing bismuth find use to a greater extent in the aircraft, machine tool, munitions and other industries.

The price of bismuth at New York remained fixed at \$1.25 a pound throughout 1941. For several years the United States price has been maintained at a little below the European parity plus duty of 7½ per cent ad valorem, chargeable upon imports into the United States. For several years the price has been well controlled.

Table 115.—Production (*) of Bismuth in Canada, 1930-1941

Year	Pounds	\$	Year	Pounds	\$
1930.....	12,732	6,366	1936.....	364,165	360,524
1931.....	118,207	157,650	1937.....	5,711	5,654
1932.....	16,855	7,340	1938.....	9,516	9,754
1933.....	78,303	81,526	1939.....	409,449(*)	466,362
1934.....	253,644	301,215	1940.....	58,529	81,004
1935.....	13,797	13,425	1941.....	7,511	10,396

(*) First commercial production in 1924.

(†) High record output.

Table 116.—Bismuth Used in the Manufacture of Canadian Medicinal and Pharmaceutical Preparations, 1940 and 1941

Item	1940		1941	
	Pounds	\$	Pounds	\$
Bismuth metal.....	30,076	36,454	30,993	38,188
Bismuth salts.....	13,527	26,136	14,159	29,251

Canadian white metal alloy foundries consumed approximately 950 pounds of bismuth metal in 1940 and 1810 pounds in 1941.

BORON

According to the United States Bureau of Mines, boron alloys are supplied by United States manufacturers, small quantities being used in the non-ferrous metals industries and in steel making. In cast iron, boron opposes graphitization on solidification and exerts an energetic whitening effect, producing a hard strong iron but reducing malleability. Recently boron has been found to be one of the so-called minor elements that stimulate plant growth and inhibit the development of certain plant diseases.

Boron carbide, boron carbide shapes and calcium boride are now produced in Canada.

World reserves of boron minerals are abundant, but known sources are confined to a few countries, chiefly the United States, Chile, Argentina, Peru, Italy and Turkey, although Borax also has been reported in Tibet, Persia, India and Ceylon.

CADMIUM

Cadmium production in Canada represents the recovery of the metal as a by-product in the electrolytic refining of zinc. Production up to 1935 came entirely from the treatment of zinc-bearing ores at Trail, B.C. by the Consolidated Mining & Smelting Company of Canada, Limited. The commercial production of the metal from the copper-gold-silver-zinc ores of the Flin Flon mine was commenced in Manitoba for the first time in 1936.

Cadmium is consumed largely in the manufacture of alloys and for plating, also in the making of such pigments as cadmium lithopone, cadmium yellows, etc. A relatively large quantity of the metal is used in the production of bearing metals for high-speed internal combustion engines. It was reported after the outbreak of war in September that both the demand and market price of cadmium showed a decided increase. "Metal and Mineral Markets", New York, quoted cadmium, June, 1941, per pound, commercial sticks, wholesale quantities, 90 cents. The Canadian price in 1941 averaged \$1.17 per pound.

Canadian production of cadmium in 1941, the greatest every attained, totalled 1,251,291 pounds valued at \$1,469,016 compared with 908,127 pounds worth \$1,056,152 in 1940. Data relating to world production of cadmium have not been complete since 1938 for which year the American Bureau of Metal Statistics estimated a world output of 8,666,422 pounds. The United States is by far the greatest producer of cadmium, other important producers at the outbreak of war included Germany, France, Norway, Poland, Mexico, South West Africa, Russia, Belgium and Australia. "Mineral Industry" reported that almost one-third of the nominal cadmium production of the world was now in German hands, but this does not necessarily mean that Germany is now well supplied with cadmium, for all the countries concerned except Germany and Poland depended almost entirely on imported ores which are no longer available. Cadmium is recovered as a by-product in the electrolytic refining of zinc and in the manufacture of lithopone, and therefore the volume of its output fluctuates with the production of these materials.

Table 117.—Cadmium Production in Canada, 1928-1941

Year	British Columbia		Manitoba		Saskatchewan	
	Pounds	\$	Pounds	\$	Pounds	\$
1928 (*)	491,894	341,374				
1929	773,976	675,294				
1930	456,582	337,871				
1931	323,139	180,958				
1932	65,425	26,824				
1933	246,041	78,733				
1934	293,611	95,665				
1935	580,530	441,203				
1936	526,034	468,170	148,133	131,838	111,749	99,457
1937	436,431	715,747	164,223	269,326	144,553	237,067
1938	510,342	410,090	115,166	92,543	73,630	59,166
1939	799,253	563,241	73,830	52,029	66,608	46,939
1940	778,791	905,734	57,742	67,154	71,594	83,264
1941	1,081,374	1,269,533	61,085	71,714	108,832	127,769

(*) First production.

Table 118.—Cadmium Consumed by Specified Canadian Industries, 1940-1941

(Pounds)

Industry	1940	1941
White metal alloys	121,008	243,717
Steel foundries	6,000	32,000
Iron foundries	9,528	12,000
Other industries	5,483	11,000
Total accounted for	142,019	298,717

Statistics relating to Canadian exports or possible imports of cadmium were not published separately by the Department of National Revenue, Ottawa, prior to 1939. In 1939 Canada exported 1,049,853 pounds of cadmium valued at \$788,180, of which 978,525 pounds worth \$750,836 went to the United Kingdom.

CALCIUM

There is no commercial production of calcium metal in Canada and data relating to possible imports of metallic calcium into the Dominion are not published. The 1940 Minerals Year Book of the United States Bureau of Mines contains the following information pertaining to the metal:

"Metallic calcium, produced before the European War almost exclusively abroad, chiefly in France, is now made in the United States, the leading consumer. It is employed more and more for grain-refining alloy steels and in small amounts in some magnesium products. Various uses, as summarized by C. L. Mantell, include: (a) Deoxidizer and alloy agent for copper, lead, and other non-ferrous metals; (b) preparation of high-temperature, high-resistance nickel-chrome and nickel-chrome-iron alloys; and (c) as a reducing agent, in form of hydride, in the manufacture of rare metals, such as titanium, vanadium and zirconium."

"The Mineral Industry" 1940, stated that the lead base baring metal hardened with calcium and barium (Frary metal) does not require the metals in its manufacture, but is produced by direct electrode position of these metals into a fused lead cathode. In the event of scarcity of tin and antimony for babbitt metal and of antimony for storage batteries plates, lead hardened with calcium and barium may be used as a substitute.

Calcium metal was quoted in the United States, September, 1939 per pound—98 to 99 per cent, 75 cents; ton lots—lump, June 11, 1942 the corresponding price was \$1.25.

CHROMITE

Canadian production of chromite in 1941 totalled 2,372 short tons valued at \$42,679 compared with 335 short tons worth \$5,780 in 1940. Production during both years originated in the eastern townships of the province of Quebec.

Shipments during 1941 were made by the following operators: E. Bruce Fletcher from lot 7, R. 12, Orford Tp.; Lot 28, R. 10, and Lot 28, R. 9, Brompton Tp.; Asbestos Corporation Limited, Beaver Mine, Thetford Mines; Chromite Limited, Sterrett mine, Cleveland Tp.; J. W. Roberge, Lots 17 and 18, R. A. Coleraine Tp.; Orel Pare, Coleraine Tp., and T. Labbe, Lots 20 and 21, R. A. Coleraine Tp. In addition, some work was conducted at the Greenshields pit, Block A, Coleraine Tp., by the Chromium Mining and Smelting Corp. Ltd. and the Chrome Association of Black Lake, Que.

The British Columbia Department of Mines reported early in 1942 that an extensive search was being made by the Geological Survey of Canada for chromite at Cascade, also in the area from Ashcroft North to the Bonaparte River, and possibly north of the Bridge River and in the Fort St. James serpentines; so far only remnants of small lenses are exposed.

Canadian production of chromite is relatively small and is far short of domestic requirements. The world production just prior to the present war was about 1,300,000 tons. Russia, Turkey, and Southern Rhodesia were each producing 200,000 tons or more a year, while South Africa, the Philippines, Cuba, New Caledonia, Yugoslavia, Greece and India were each producing 50,000 tons or more. Russia is probably the largest producer but present world production data are not available.

A report prepared by the Bureau of Mines, Ottawa, contains the following information:

"Until recently, metallurgical chromite had to contain a minimum of 48 per cent Cr_2O_3 and a chrome-iron ratio of not less than 3 to 1, but in December, 1941, the following specifications were drawn up by the United States Metals Reserve Company: "High grade", minimum of 45 per cent Cr_2O_3 , and maxima of 11.0 per cent silica; 0.2 per cent phosphorus; 0.5 per cent sulphur; and a chrome-iron ratio of 2.5 to 1; "Low Grade A", minimum of 40 per cent Cr_2O_3 ; maxima of 13 per cent silica; 0.5 per cent phosphorus; 1 per cent sulphur; and a 2 to 1 ratio; "Low grade B", minimum of 40 per cent Cr_2O_3 with no limits set on impurities or ratio. For the special Canadian product, Chrom X, low grade ores have been used in which the chrom-iron ratio has been as low as 0.6 to 1, with the Cr_2O_3 content ranging from 25.0 to 43.0 per cent.

"Specifications for refractory ore suitable for bricks vary somewhat, and depend upon the kind of brick to be made. A Canadian manufacturer indicates maxima allowances of 20 per cent Fe_2O_3 , 18 per cent Al_2O_3 , and 4 per cent SiO_2 . The silica should be as low as possible and it

usually occurs in the ore as serpentine, a hydrated magnesium silicate, having a comparatively low melting point. It is very important that the chromite be present in an evenly and finely distributed form, not as coarse grains mixed with blobs of the silicate. The ore should be hard and lumpy, and the lumps should be plus 10 mesh. Provided the impurities are within the above specifications, the chromium content may vary within certain limits, but it is generally between 40 per cent and 45 per cent Cr_2O_3 .

"The principal Canadian buyers of chromite for metallurgical use are: Chromium Mining and Smelting Corporation, Sault Ste. Marie, Ontario, and the Electro-Metallurgical Company of Canada, Welland, Ontario. The only important purchaser of refractory ore is Canadian Refractories Limited, Canada Cement Building, Montreal, Quebec. The types and grades of ore acceptable to these buyers are indicated under "Specifications".

"United States price quotations early in 1942 per long ton of 48 per cent Cr_2O_3 imported ores c.i.f., Atlantic ports, excluding war risk insurance were \$35 to \$40 for lump ore and \$33 for concentrate. Prices effective December 1941 for domestic ores of the specifications given above, per long dry ton f.o.b. buyers stock piles, are as follows: "High grade"—\$40.50, plus 90 cents per long unit (22.4 pounds) for each per cent Cr_2O_3 in excess of 45 per cent, or plus \$1.50 for each 0.1 per cent increase of chrome-iron ratio to a maximum of 3 to 1; "Low grade A"—\$28, plus same amounts extra for grade and ratio; "Low grade B"—\$24, plus 60 cents for each additional unit of Cr_2O_3 . The grade of the shipment is determined by the specifications it meets; thus, an ore containing 45 per cent Cr_2O_3 and 4.5 per cent phosphorus, is classified as "Low grade A".

"Canadian ores containing 35 to 45 per cent Cr_2O_3 ranged in price from \$17.50 to \$26.00 per ton on cars at mines.

"Canada is now a large consumer of chromite and the requirements are likely to increase. It is becoming increasingly difficult also to obtain the necessary supplies from outside sources and, accordingly, there is an urgent need for a greater domestic production. Although an eventual large output of high grade lump ore is not expected, the known low grade deposits should yield a substantial output of concentrate of metallurgical grade."

In 1942 an important discovery of chromiferous deposits was reported to have been made in the Bird River area of Eastern Manitoba; it is understood that extensive exploration work was commenced on these deposits.

Table 119.—Production of Chromite in Canada, 1928-1941

Year	Short tons	\$	Year	Short tons	\$
1928.....			1935.....	1,144	14,947
1929.....	126	900	1936.....	(a)	13,578
1930.....			1937.....	(a)	43,250
1931.....			1938.....		
1932.....	78	1,113	1939.....		
1933.....	30	348	1940.....	335	5,780
1934.....	111	1,578	1941.....	2,372	42,679

(a) Quantity not published.

Table 120.—Consumption of Certain Chromium Products and Chrome Ore in Specified Canadian Industries, 1940 and 1941

Industry	Item	1940		1941	
		Pounds	\$	Pounds	\$
Ingots and castings.....	Chrome ore.....	1,010,240	20,503	1,248,000	30,619
Ingots and castings.....	Ferrochrome.....	4,350,080	336,317	6,878,000	690,600
Paints, pigments and varnishes.....	Chrome colours.....	1,739,510	310,255	2,370,872	464,089
Paints, pigments and varnishes.....	Sodium bichromate.....	798,095	71,407	887,797	88,329
Leather tanning.....	Sodium bichromate.....	1,809,919	154,829	1,905,201	179,306
Glass manufacture.....	Chromite.....	8,000	193	4,000	204

NOTE.—In addition to the items listed above, a considerable quantity of chromite is utilized in the manufacture of Canadian ferro-alloys, also a relatively small quantity of sodium bichromate is consumed in the chemical industry. Chrome is also employed in Canada in the manufacture of refractories.

IRON ORE

Production of iron ore in Canada in 1941 totalled 516,037 short tons valued at \$1,426,057 compared with 414,603 short tons worth \$1,211,305 in 1940. Production during both years represented shipments of beneficiated ore from the new Helen mine located in the Michipicoten area of Ontario. No iron ores were commercially produced in Canada for some years prior to 1939.

The Bureau of Mines, Ottawa, in a review of iron ore mining in 1941 stated:

"Deposits of iron ore in Canada are many and widespread and include hematite, siderite, magnetite, bog iron, and magnetic sand. Because of the availability at low cost of higher grade ores in the Lake Superior iron ranges of the United States and in Newfoundland, no iron ore from domestic sources was produced in Canada from 1923 until 1939.

"Algoma Ore Properties, Limited, a wholly owned subsidiary of Algoma Steel Corporation, Limited, encouraged by the bounty of two cents per unit (22 pounds) of metallic iron provided by the Ontario Government, began in 1937 preliminary development work at its New Helen mine in the Michipicoten area, Ontario, and the first sinter was produced in July, 1939.

"The New Helen deposit is estimated by the company to contain at least 100,000,000 tons of siderite or carbonate ore, averaging about 35 per cent iron, and, to fit it for commercial use in blast furnaces, a sintering plant capable of treating 3,000 tons of ore a day was built, the sinter produced approximating the following analysis:

	%		%
Iron.....	53.40	Alumina.....	2.06
Phosphorus.....	0.03	Lime.....	3.95
Silica.....	7.00	Magnesia.....	7.50
Manganese.....	3.00	Sulphur.....	0.035

"Shipments of sintered ore in 1941 were shipped partly via Michipicoten Harbour, 8 miles from the sintering plant, to the company's blast furnaces at Sault Ste. Marie, Ontario, partly to the Canadian Furnace Company at Port Colborne, but mostly to United States ports on the Lower Lakes for use in United States blast furnaces. The manganese content is of special interest to users.

"Steep Rock Iron Mines Limited continued its program of exploratory and development work on its hematite property east of Atikokan, and about 135 miles west of Port Arthur, Ontario. This work indicates that the deposits, which were discovered in the winter of 1937-38 under the bed of Steep Rock Lake by diamond drilling through the ice, are large and high in grade. A shaft on the shore, west of orebody "A" was sunk during the winter of 1939-40 to a depth of over 800 feet, and a crosscut was then driven on the 800-foot horizon toward the orebody. Water difficulties were so serious that the crosscut could not be completed, and it became evident that drainage of the lake was necessary to mine the ore. The company's development program includes the diversion of the Seine river, which now flows through the lake, and the pumping out of the lake itself for open-pit mining of the large orebodies already indicated. This deposit appears to be one of the most important mineral discoveries made in Canada in recent years. During the past winter churn-drilling operations were carried on through the ice to determine the continuity of the orebodies in depth. These holes showed similar high grade ore as outlined by the earlier diamond drilling. Detailed surveys of the route of the diversion are being made and negotiations are under way toward the financing of the diversion of the river, the drainage of the lake, and to bring the property into production.

"The old Josephine mine in the Michipicoten area, Algoma district, has been taken over by Ventures Limited. The deposit is under the bed of Parks lake, three quarters of a mile from the Algoma Central railway and about 20 miles from Michipicoten Harbour. The property was drilled first in 1900 and again in 1913-14. Two shafts were sunk in 1901, one to a depth of 150 feet. During the spring and summer of 1941, a total of 6,500 feet of diamond drilling was done to check the previous work. Results were sufficiently encouraging to justify underground exploration. Camps were built, and a mining plant is being installed preparatory to shaft sinking. It is proposed to sink to a depth of approximately 1,000 feet, and to explore the ore-bearing zone on the 500-foot and 1,000-foot horizons. No estimate of ore tonnages or grade has been given

out by the present operators. According to the former owners some 850,000 tons of hematite were reported as proved by diamond drilling.

"Ventures Limited (Frobisher Exploration Co. Ltd.) is also investigating the Bessemer, Childs and Runkin properties, in Mayo township, Hastings county about 80 miles north of Trenton, and other iron deposits in Ontario.

"Extensive surveys and exploration work have been carried on by Labrador Mining and Exploration Company of Montreal, near Sawyer Lake and vicinity, along the Quebec-Labrador boundary line. The company reports that six deposits of iron ore were discovered during the short summer field seasons of 1936 to 1939 inclusive. The principal deposit located at Sawyer lake, in the Newfoundland Labrador Concession, about 280 miles north of Seven Islands in the Gulf of St. Lawrence, is estimated by the Company to contain 2,200,000 tons of hematite ore (averaging 65 per cent iron) per 100 feet of depth. The phosphorus content is under 0.04 per cent. Four other deposits are of good grade, and one of them is rich in manganese. The total possible reserve in these four deposits is estimated by the Company at 70,000,000 tons to a depth of 1,000 feet. The other deposit is high in silica, and is believed to represent a large tonnage. Field work on this deposit is being planned for the 1942 season under the direction of Hollinger Consolidated Gold Mines, Limited which has acquired an interest in Labrador Mining and Exploration Company. Geological and exploration work are also planned on the Concession in a contiguous area in Quebec, which area embraces a total of approximately 20,000 square miles. The exploitation of these deposits would necessitate the construction of a railway line from Seven Islands, which port is open to navigation the year around.

"The report on the proposed iron and steel works in British Columbia by Arthur G. McKee and Company of Cleveland, Ohio, for the British Columbia Department of Mines was made public on February 26, 1942. The general plan involves the annual production of 75,000 tons of finished steel products. The proposed site is at Union Bay, on the east coast of Vancouver Island. The province contains many deposits of magnetite and a few of hematite and limonite. Three deposits, owing to their proximity to Union Bay, have been selected for consideration; Zeballos, on the northwest coast of Vancouver Island, with 500,000 tons of magnetite averaging 68½ per cent iron with low manganese and no undesirable elements; Iron Hill, south of Campbell river on the east coast of Vancouver Island, with 1,000,000 tons of magnetite ore available; Texada Island, within 20 miles of Union Bay with several deposits of good grade ore. The proposed site is adjacent to coking coal and limestone supplies.

"Ventures Limited made the announcement in the latter part of February, 1942, of its acquisition of the old Anyox copper plant at Anyox and the proposed erection in British Columbia of a plant for the production of iron and steel from scrap.

"Dominion Steel and Coal Corporation, Limited, with plants at Sydney, Nova Scotia, obtains its iron ore from its own mines at Wabana, Newfoundland, Steel Company of Canada, Limited, at Hamilton, Ontario, and Canadian Furnace, Limited, at Port Colborne, Ontario, obtain their iron ore supplies from the Lake Superior region of the United States. Algoma Steel Corporation obtains most of its requirements from the United States and the remainder from the New Helen mine.

"Bounties on the production of iron ore are offered by the provinces of Quebec, Ontario, and British Columbia. In Quebec, the premium is at the rate of four-fifths of one cent for each unit (22 lbs.) of iron metal contained in every ton of iron ore. In Ontario, the bounty is 2 cents per unit of metallic iron in the long ton of low grade iron ore beneficiated in Ontario so as to be suitable for use in the blast furnace, or on natural ore of commercial quality smelted in Canada. In British Columbia, the bounty paid must not exceed \$3.00 a ton on the proportion of pig iron produced from ore mined in the Province, and must not exceed \$1.50 a short ton on the proportion of pig iron produced from ore mined outside the Province. A bounty not to exceed \$1.00 a short ton is also offered on steel shapes of commercial utility manufactured in British Columbia.

"There are no official Canadian price quotations for iron ore. Prices f.o.b. Lake Erie ports, per long ton for Lake Superior, U.S.A., iron ore, 51½ per cent iron ore are: Messabi, Non-Bessemer—\$4.45, Bessemer—\$4.60; Old Range, Non-Bessemer—\$4.60, Bessemer—\$4.75. The price of Brazilian ore, f.a.s. Brazilian ports, 68 per cent iron, is 7 cents per long ton unit or \$4.76 a long ton."

Complete data relating to world production of iron ores since 1939 are not available.

Table 121.—Shipments of Iron Ore from Wabana Mines, Newfoundland, 1931-1941

Year	To Nova Scotia	To the United States	To Europe	Total Shipments
	Short tons	Short tons	Short tons	Short tons
1931.....	234,148	25,670	530,079	789,897
1932*.....			166,303	166,303
1933.....			254,383	254,383
1934*.....	346,178		344,769	690,947
1935.....	611,581		81,123	692,704
1936.....	527,540	12,656	252,676	792,872
1937.....	702,714	50,490	1,242,088	1,995,292
1938.....	555,348		1,305,068	1,860,416
1939.....	576,198	16,184	980,098	1,572,480
1940.....	762,310	26,118	789,578	1,578,006
1941.....	943,643	63,869	316,530	1,324,042

* Shipments to Europe in 1930, 1932 and 1934 were to Germany only, while from 1935 to 1938 shipments went to both Germany and Great Britain. Shipments to Germany in 1933 totalled 1,256,230 short tons, and in 1939, 768,743 tons. In 1940 and 1941 all European shipments went to Great Britain.

IRON AND STEEL AND THEIR PRODUCTS

The Primary Iron and Steel Industry

Statistics for the Primary Iron and Steel Industry include data for all establishments in Canada which were engaged chiefly in the manufacture of (a) pig iron, (b) ferro-alloys, (3) steel ingots and steel castings, (d) hot rolled iron and steel products, (e) cold rolled or cold drawn steel bars, strips and shapes. Forty-three firms were included in this industry in 1941 and reports were received for 58 different plants or departments, including 4 blast furnace departments, 4 ferro-alloy plants, 32 steel furnace divisions, and 18 rolling or drawing mills. Separate reports were received for blast furnace departments, for steel furnace divisions and for rolling mills even when all three were units of a single works.

Factory sales of pig iron, ferro-alloys, steel ingots and castings and finished rolled products were 43.6 per cent higher in 1941 than in 1940, the values being \$164,566,392 and \$114,598,409, respectively. Twenty-seven works in Ontario accounted for 68.7 per cent of the total for Canada or \$113,108,878; 6 plants in Nova Scotia accounted for 14.9 per cent or \$24,403,239; 15 plants in Quebec for 13.7 per cent or \$22,538,137, while the remaining \$4,516,138 or 2.7 per cent was accounted for by 4 plants in Manitoba, 4 in British Columbia and 2 in Alberta.

Fixed and working capital employed in this industry amounted to \$168,750,344, including \$96,089,729 for the value of land, buildings and plant equipment, \$40,835,632 for the value of raw and finished materials on hand and in process, and \$31,824,983 for operating capital, such as, cash, bills and accounts receivable. For works in Ontario the capital was \$114,287,236; in Nova Scotia, \$26,615,501; in Quebec, \$24,412,005; in Manitoba, \$2,346,005; and in Alberta and British Columbia, \$1,089,597.

In 1941, an average of 23,735 people were employed in this industry, this being an increase of 33.5 per cent over the 1940 average of 17,774. About 1,417 persons worked in the blast furnace departments during the year, 8,506 in the steel furnaces, 11,976 in the rolling mills and 1,836 in ferro-alloy plants (exclusive of those producing ferro-alloys as a by-product). Sixty-one per cent of the employees or 14,596 worked in plants in Ontario, 4,907 in Quebec, 3,257 in Nova Scotia, 721 in Manitoba and 254 in Alberta and British Columbia.

Payments in salaries and wages during 1941 amounted to \$45,037,095, a gain of 54 per cent over the previous year's total of \$29,207,036. Salaries advanced to \$4,163,580 from \$3,488,044 and wages to \$40,873,515 from \$25,718,992.

Materials used in manufacturing processes cost \$78,824,366 in 1941 compared with \$54,045,692 in 1940, and the cost of fuel and electricity was \$13,888,384 against \$9,582,791, an increased expenditure of 45.8 per cent for materials and 44.9 per cent for fuel and power.

Pig Iron

Output of 1,528,053 net tons of pig iron in 1941 was 16·7 per cent over the 1,309,099 tons reported for the previous year. Production of basic iron amounted to 1,272,171 tons or 83 per cent of the total; foundry iron amounted to 126,521 tons and malleable iron to 129,361 tons.

Producers' sales of pig iron totalled 338,066 tons at \$7,080,242 in 1941 compared with 277,311 tons at \$5,868,769 in 1940, a gain of 21·9 per cent in quantity and 20·6 per cent in value.

Charges to iron blast furnaces during the year included 2,542,826 tons of imported iron ore, 166,263 tons of Canadian ore, 1,362,530 tons of coke, 465,960 tons of imported limestone and 182,605 tons of Canadian limestone.

Imports of pig iron during the calendar year declined to 4,729 tons from 29,703 tons in 1940 and exports dropped to 380 tons from 4,113 tons.

Producers' stocks at the end of 1941 totalled 27,049 tons compared with 76,560 tons at the end of the previous year.

The apparent consumption of pig iron in Canada, as calculated by deducting the exports from the sum of the production and imports, and allowing for changes in producers' stocks, amounted to 1,581,913 tons in 1941 or 19 per cent more than in 1940, when the apparent domestic supply was 1,327,304 tons.

Producers of pig iron in Canada had 11 blast furnaces at the end of 1941 which could produce 2 million net tons a year if operated at rated capacity. Actual production of 1,528,053 tons in 1941 showed an operating rate of about 76 per cent. Only 10 furnaces were in blast during the year; the furnace remaining out of blast is rated at 336 tons a day but has been inactive for several years.

Ferro-Alloys

Ferro-alloys were made in 1941 by 10 different concerns, 5 of which recovered ferrosilicon as a by-product in the manufacture of abrasives. Output of ferro-alloys in 1941 amounted to 198,364 tons, a gain of 32·7 per cent over the 149,394 tons reported for 1940.

Altogether, ferrosilicon was made in nine different plants, spiegeleisen in two and ferro-chrome in two. Other alloys produced by one firm only included ferromanganese, sili-cospiegel, silicomanganese, silicon metal and calcium silicon.

Steel Ingots and Castings

Steel production advanced 20·3 per cent to 2,712,151 tons in 1941 from 2,253,769 tons in 1940, the output of steel ingots going to 2,593,512 tons from 2,177,630 tons and steel castings to 118,639 tons from 76,139 tons. Factory sales of ingots and castings totalled 333,855 tons at \$22,508,948.

Thirty-four steel plants were in operation during the year. These plants had 109 furnaces, including 48 basic open hearth with an annual capacity of 2,698,900 net tons, 58 electric furnaces rated at 488,900 tons and 3 converters at 8,200 tons. There were just 10 makers of steel ingots with capacity of about 3 million net tons per annum. The total annual steel capacity of all plants, including ingots and castings, was 3,196,000 tons at the year end.

Operating steel furnaces in 1941 used 1,340,441 net tons of pig iron, 1,599,124 tons of scrap iron or steel, 155,273 tons of ore, 202,609 tons of limestone, 92,695 tons of dolomite, 40,799 tons of lime, 67,099 tons of silica sand, 18,127 short tons of magnesite and 25,063 tons of ferro-alloys.

Rolled and Drawn Steel

In 1941 there were 15 hot rolling mill plants in operation, 1 cold rolling plant and 2 mills making cold drawn shapes. Ten of these mills were in Ontario, 3 in Nova Scotia, 3 in Quebec, 1 in Manitoba and 1 in Alberta.

Rolling mill sales advanced 32.7 per cent to \$114,056,762 from \$85,907,967 in 1940. The main items sold during the year under review were—444,634 tons of hot rolled bars at \$29,786,195; 469,669 tons of plate, sheet, hoop, band and strip at \$36,283,538; 172,459 tons of rails and rail fastenings at \$7,915,019; 276,780 semi-finished rolled forms, such as, blooms, billets, etc., at \$12,679,034; 193,251 tons structural shapes at \$9,600,490; 121,422 tons wire rods at \$5,214,493, etc.

Table 122.—Provincial Distribution of Active Plants in the Primary Iron and Steel Industry, 1941

Province	Number of firms	Pig Iron		Steel Ingots and Castings		Rolling and drawing mills	Ferro-alloys (a)
		Number of plants	Number of blast furnaces	Number of plants	Number of steel furnaces		
Nova Scotia.....	4	1	3	2	16	3	.....
Quebec.....	13	.....	.....	12	25	3	1
Ontario.....	17	3	8	11	52	10	3
Manitoba.....	3	.....	.....	3	4	1	.....
Alberta.....	2	.....	.....	2	2	1	.....
British Columbia.....	4	.....	.....	4	8	.....	.....
Canada.....	(b) 43	4	11	34	107	18	4

(a) Not including artificial abrasive plants which made ferrosilicon as a by-product.

(b) Some firms operate in more than one province.

Table 123.—Principal Statistics of the Primary Iron and Steel Industry, 1941

	No. of plants	Capital employed	Average number of employees	Salaries and wages	Cost of fuel and electricity at works	Cost of materials at works	Gross selling value of products at works
		\$		\$	\$	\$	\$
Nova Scotia.....	6	26,615,501	3,257	5,504,542	1,723,839	14,161,236	24,403,239
Quebec.....	16	24,412,005	4,907	7,596,337	2,196,047	9,485,453	22,533,137
Ontario.....	27	114,287,236	14,596	30,512,248	9,551,266	53,670,927	113,108,873
Manitoba.....	4	2,346,005	721	1,041,583	348,314	1,195,320	3,438,024
Alberta.....	3	.....	.....	.....	.....	.....	.....
British Columbia.....	4	1,089,597	254	382,385	68,918	311,430	1,078,114
Canada.....	60	168,750,344	23,735	45,037,095	13,888,384	78,824,366	164,566,392
Per cent change 1941 from 1940.....	.....	+26.0	+33.5	+54.2	+44.9	+45.8	+43.6

NOTE.—Profits or losses cannot be calculated from above figures as data are not available for general expense items, such as, interest, rent, depreciation, taxes, insurance, advertising, etc.

Table 124.—Production of Pig Iron and Sale by the Producers, 1940 and 1941

Grades	Delivered in molten condition	Machine cast	Total tonnage made	Sales	
				Quantity	Income from sales
	Net tons	Net tons	Net tons	Net tons	\$
1940					
Basic.....	949,265	142,319	1,091,584	61,636	1,232,426
Foundry.....	111	120,764	120,875	116,752	2,494,054
Malleable.....	238	96,402	96,640	98,923	2,142,289
Total.....	949,614	359,485	1,309,099	277,311	5,868,769
1941					
Basic.....	1,137,869	134,302	1,272,171	70,221	1,389,979
Foundry.....	115	115,791	115,791	119,930	2,508,086
Malleable.....	189	139,902	140,091	147,915	3,182,177
Total.....	1,138,058	389,995	1,528,053	338,066	7,080,242

NOTE.—Silvery pig iron has been included with ferro-alloys.

Table 125.—Materials Charged to Iron Blast Furnaces, 1940 and 1941

Materials	1940		1941	
	Quantity	Cost at furnace	Quantity	Cost at furnace
	Net tons	\$	Net tons	\$
Iron ore—Imported (crude).....	2,188,074	7,325,338	2,542,826	9,238,799
Canadian (beneficiated).....	152,852	553,747	163,890	569,853
Canadian (crude).....	1,791	4,957	2,373	6,662
Mill cinder, roll scale, flue dust, etc.....	130,171	279,271	136,698	314,248
Scrap (net charge).....	28,691	333,708	47,271	551,717
Limestone—				
From Canadian quarries.....	125,075	164,977	182,605	237,578
From foreign sources.....	454,376	470,293	465,960	551,773
Coke.....	1,223,173	7,466,407	1,362,530	7,203,703
Other materials.....		148,097		136,245
Total.....		16,751,795		18,840,578

Table 126.—Blast Furnaces in Canada, 1939-1941

Names of companies	Location of plants	Number of stacks	Total daily capacity (24 hours)	Number of days in blast		
				1939	1940	1941
Dominion Steel and Coal Corporation, Ltd.	Sydney, N.S.....		Net tons			
		1	392	31	357	365
		1	336	265	354	365
		1	616	365	358	298
Total.....		3	1,344			
Canadian Furnace Company, Limited.....	Port Colborne, Ont.....	1	392	*200	*199	*279
The Steel Company of Canada, Limited...	Hamilton, Ont.....	1	364	158	366	365
		1	728	365	330	365
		1	980			110
		3	2,072			
Algoma Steel Corporation, Limited.....	Sault Ste. Marie, Ont.....	1	336		181	365
		1	336			
		1	504	362	316	262
		1	616	85	366	365
Total.....		4	1,792			
Total for Canada.....		11	5,600			

* For making pig iron; ferro-alloys also made in this furnace.

Table 127.—Production of Ferro-Alloys, 1928-1941

Years	Net tons	Years	Net tons
1928.....	50,223	1935.....	63,410
1929.....	99,810	1936.....	85,438
1930.....	73,050	1937.....	91,921
1931.....	52,376	1938.....	62,637
1932.....	18,100	1939.....	85,540
1933.....	33,749	1940.....	149,394
1934.....	35,751	1941.....	198,364

Table 128.—Production of Steel Ingots and Steel Castings, By Grades, 1937-1941
(Net tons)

Years	Steel ingots		Steel Castings			Total steel ingots and castings
	Open hearth	Electric	Open hearth	Converter	Electric	
1937.....	1,427,991	68,584	26,686	1,138	46,828	1,571,227
1938.....	1,172,867	62,598	17,388	850	40,109	1,293,812
1939.....	1,410,339	79,718	17,473	934	42,590	1,551,054
1940.....	2,041,947	135,633	21,085	2,268	52,786	2,253,769
1941.....	2,394,098	199,414	29,401	3,371	85,867	2,712,151

Table 129.—Materials Used in Steel Furnaces, 1940 and 1941

Materials	1940		1941	
	Quantity	Cost of purchased materials	Quantity	Cost of purchased materials
	Net tons	\$	Net tons	\$
Pig iron—Own make.....	1,017,422	.....	1,261,774	.....
Purchased.....	65,767	1,382,107	78,667	1,843,144
Scrap iron or steel—Own make.....	541,582	.....	698,761	.....
Purchased.....	785,929	12,469,326	900,363	18,708,469
Spiegeleisen.....	4,284	150,838	5,316	365,656
Siliocospiegeleisen.....	.....	.....	9	2,120
Ferrovandium.....	57	130,566	182	433,639
Ferromanganese.....	17,101	1,464,117	21,250	1,811,031
Silicomanganese.....	2,022	166,286	4,518	445,197
Ferrosilicon.....	9,099	465,831	14,836	616,954
Ferrochrome, high carbon.....	981	114,188	1,692	210,621
low carbon.....	1,194	222,129	1,747	479,979
Ferromolybdenum.....	13	18,950	55	78,504
Ferrophosphorus.....	804	66,595	745	63,309
Ferroselenium.....	1	1,832	2	3,063
Ferrotitanium.....	132	24,233	181	52,128
Ferrotungsten.....	376	829,859	482	1,003,314
Ferrozirconium.....	1	93	40	1,647
Calcium silicon.....	176	48,617	380	110,503
Calcium manganese silicon.....	.....	.....	114	40,312
Other ferro-alloys.....	6	14,994	80	162,127
Aluminium ingots.....	438	171,850	638	261,350
Copper ingots.....	196	45,062	108	23,855
Nickel.....	775	459,114	2,348	1,225,715
Other metals.....	.....	55,042	.....	83,023
Ore, iron, crude.....	136,623	1,176,064	148,807	1,792,029
Ore, iron, calcined, roasted or treated.....	8,501	32,563	5,778	21,833
Ore, manganese.....	29	1,300	64	3,316
Ore, chrome.....	505	20,503	624	30,619
Bentonite.....	811	24,909	1,939	62,105
Coal, anthracite.....	401	3,801	587	5,946
bituminous.....	257	2,302	574	4,733
Coke.....	5,523	51,367	5,053	71,074
Charcoal.....	69	2,176	58	2,349
Dolomite, crude.....	59,284	123,429	71,087	159,037
calcined.....	21,949	136,360	21,608	160,602
Fluorspar.....	15,307	327,187	17,054	366,701
Lime.....	69,206	413,756	40,799	370,545
Limestone, Canadian.....	43,413	70,581	67,837	108,124
Imported.....	122,562	124,077	134,772	158,218
Magnesite.....	13,673	506,032	18,127	682,742
Electrodes.....	.....	307,059	.....	489,593
Silica sand.....	32,243	235,039	67,099	469,874
Other foundry sand.....	.....	55,978	.....	114,026
Firebrick, fireclay and other refractories.....	.....	1,099,728	.....	1,862,876
Calcium molybdate and molybdenum oxide briquettes.....	.....	216,230	.....	525,671
All other materials.....	.....	1,532,900	.....	1,951,951
Total Value of Metals, Ores and Other Materials Used.....	.....	24,761,970	.....	37,444,624

Table 130.—Summary of Steel Furnace Capacity in Canada, December 31, 1941

Type of furnace	Number of furnaces at end of year	Total rated annual capacity
		Net tons
Basic open hearth.....	48	2,698,900
Electric.....	58	488,900
Converter.....	3	8,200
Total	109	3,196,000

LITHIUM

The principal commercial lithium ores are amblygonite, a fluo-phosphate of lithium and aluminium; spodumene, a silicate of these two elements, and lepidolite, or lithia mica, also a silicate. The lithia content of these minerals, as mined, commonly ranges around 8 to 9 per cent for amblygonite, 4 to 7 per cent for spodumene, and 3 to 5 per cent for lepidolite. All of the above minerals are known to occur in Canada but there has, as yet, been only a small production,

mainly of lepidolite and spodumene. The important deposits are all in Manitoba in the south-eastern part of the province. The first commercial shipment of Canadian lithium ore to be officially recorded was reported during 1937. This production came from deposits located at Bernie Lake, Manitoba, and was valued at \$1,694; the mineral was consigned to the United States for the manufacture of lithium compounds and possible lithium metal. No commercial shipments of lithium ores from Canadian mines were reported since 1937. The only official report of any lithium mining operations in 1941 was received from the Lithium Corporation of Canada Limited. This company mined ten tons of crude ore from its deposits located at Bernie Lake, Lac du Bonnet mining division, Manitoba; the work was conducted early in the year and no commercial shipments were made.

Lithium is the lightest of all the metals, having a specific gravity of only 0.53. A wide range of master alloys of lithium with calcium silicon, brass, copper, manganese, zinc, lead, tin, magnesium, and aluminium, has been developed in the United States. The lithium content of the base metal varieties ranges from 0.5 per cent to 10 per cent, and rises to as high as 50 per cent in the light calcium and silicon series. The component metals are produced by electrolysis, and the alloys are made in an electric vacuum furnace. The alloys are furnished in lumps, slabs, cubes, or plates, and are being used to an increasing extent as deoxidizing, degasifying, and desulphurizing agents in copper, brasses, bronzes, etc., and for the hardening of lead and aluminium. Alloys of lithium with zinc, aluminium, and magnesium are strong and are highly resistant to corrosion. It is stated that the addition of one-third of a pound of lithium per ton imparts ductility to alloy steels.

"Metal and Mineral Markets", New York, quoted lithium metal, June, 1941, per pound, 98 to 99 per cent 100 pound lots \$15. Amblygonite was quoted, June, 1941, per ton f.o.b. mines 8 to 9 per cent Li_2O \$40. Lepidolite, per ton, \$24 to \$25 for ordinary grades, lump, f.o.b. mines. These same prices were being quoted in June, 1942. Official reports made by industry show no consumption of either lithium metal or lithium alloys in Canada.

MAGNESIUM

The first commercial production of magnesium in Canada since 1918 occurred in 1941. The metal was produced in 1941 at Trail, B.C. by the Consolidated Mining and Smelting Company of Canada Limited; output, in the form of magnesium powder, totalled 10,905 pounds with an estimated value of \$2,944. Magnesite used in the production of this powder was obtained from deposits located at Marysville in the Fort Steele Mining District.

It was announced early in 1942 that the Wartime Metals Corp., Ottawa, has been formed by the Canadian Government to assume responsibility for arrangements that have been made for the production in Canada of metallic magnesium and for any other emergency projects that may be decided upon for the production of war metals. It was stated that a large amount of money will be spent on construction of a magnesium plant in Renfrew County, Ontario. The plant will be operated without profit or fee by a private company, Dominion Magnesium Limited. A method for extracting magnesium from dolomite (ferrosilicon process), developed by Dr. Lloyd M. Pidgeon, will be employed. Production at this plant commenced during the late summer of 1942.

During 1941 the Aluminum Company of Canada Limited erected a plant at brucite-bearing deposits located near Wakefield in the Gatineau River valley of the province of Quebec. This plant commenced the production of brucite early in 1942. It is understood that the first shipments of brucite concentrates were consigned to Canadian Refractories Ltd., Kilmar, Que., for the manufacture of magnesia refractories. Shipments of calcined brucite rock were also made in 1942 from Wakefield to Dominion Magnesium Ltd., Renfrew, Ont.

National defence requirements, especially in the aircraft industry, have created a tremendous demand for magnesium metal. Complete data relating to world production of the metal are not available; in 1940 world output was estimated by "The Mineral Industry" at 44,000 short tons; eight nations producing in order of importance were Germany, United Kingdom, United States, U.S.S.R., Switzerland and Italy. In 1940 the only process commercially used in the United States for the production of magnesium metal involved the electrolysis of magnesium chloride in a fused salt bath, the raw material being derived from brine obtained from saline wells or sea water.

Late in 1941 it was reported that the Defense Plant Corporation, United States, had financed an expanded magnesium production totalling approximately 150,000 tons annually.

Magnesium was quoted in the United States, June, 1941: per pound ingots (4 x 16 inch) 99.8 per cent, carload lots, 27 cents; 100 pound lots or more l.c.l., 29 cents. Extruded sticks, carload lots, 34 cents. Prices June, 1942: were: per pound ingots (4 x 16 inch) 99.8 per cent, carload lots, 22½ cents; 100 pounds or more l.c.l., 24½ cents. Extruded sticks, carload lots, 29½ cents.

"Magnesite is available in many countries. Russia is probably the world's greatest producer of magnesite, but almost all is for domestic use.

"Magnesite is usually calcined before shipment and the resultant magnesia is used for the making of refractory products to withstand extremely high temperatures, for making oxychloride cement, and for magnesium metal. It is also the basis of a number of magnesium salts and has many minor uses. The world-wide demand for magnesium metal has greatly stimulated interest in deposits of magnesite. Although until three years ago almost all the world's magnesium was made from magnesium chloride brine and from waste water used in treating potash minerals, magnesite is now an important source of this light metal in Europe, England, and the United States.

"Competing with magnesite as sources of magnesia products are dolomite, brucite, and seawater. Dolomite, in addition to its use as a refractory material has long been the principal source of basic magnesium carbonate and pure magnesium oxide, and processes have been worked out for the production of magnesium metal from it. Brucite is being quarried in the United States for the manufacture of refractories. The extraction of magnesia from sea-water is now being done on a very large scale in both England and the United States, the material so obtained being used for making magnesium metal as well as for various industrial and pharmaceutical purposes.

"Prices of calcined magnesite in 1941 f.o.b. Montreal or Toronto as quoted by Canadian Chemistry and Process Industries were \$70 to \$90 per ton. This price has obtained since November, 1939, when the price rose from the \$48 to \$60 range that had prevailed for more than a year previously." (Bureau of Mines, Ottawa).

Table 131.—Consumption of Magnesium Ingots in Canada, 1939-1941

	1939	1940	1941
		(pounds)	
In non-ferrous smelters.....	31,990	192,000	825,717
In white metal alloy foundries.....	774	7,770	9,515
In brass and bronze foundries.....	16	163	42,821
In aluminium products.....		240	127
In ammunition.....		404	
In pharmaceuticals.....	200		
Total Accounted For.....	32,980	200,577	878,180

MANGANESE ORE

There were no commercial shipments of domestic manganese ores in Canada during 1941. There was, however, 7,500 pounds of manganese metal valued at \$2,250 produced in Nova Scotia from ores mined by the East Mountain Mining Company. A report issued by the Bureau of Mines, Ottawa, contained the following information:

"The manganese ores that have been mined in Canada are pyrolusite (MnO_2), psilomelane (H_4MnO_6), manganite ($\text{Mn}_2\text{O}_3\cdot\text{H}_2\text{O}$) and braunite (Mn_2O_3), all of which are black or grey-black and comparatively hard; bog manganese, a soft earthy black oxide; and a small amount of rhodochrosite (MnCO_3), a pink, fairly soft, mineral. Pyrolusite is the most common and most important and when pure contains 63 per cent manganese. It is much softer than the other hard rock ores and can be distinguished in the field by the ease with which it blackens the fingers. Most of the hard rock deposits are replacements in limestone, but they also occur in the form of accumulated nodules and cementing material in siliceous sediments, and as veins in metamorphosed precarboniferous rocks. Canadian production is small and is far short of wartime requirements.

"Activity in 1941 was confined mainly to New Brunswick. Nabco Manganese Mining Company continued to develop its deposit on Gowland Mountain near Elgin. Douglas Manganese Company prospected some showings on the Harrison claims near the Nabco property and the Sussex Manganese Mining Company did further work on the old Jordan Mountain deposit near Sussex. Early in 1942 Mount Forest Manganese Mining Company started to prospect the Turtle Creek deposits in Hillsborough Parish; J. H. Dunright prospected a deposit of medium grade ore near Quaco Head, 30 miles east of Saint John. The old Markhamville mine, 8 miles south of Sussex, was taken over by Martin Manganese Mining Syndicate.

"In Nova Scotia, East Mountain Mining Company operated the old East Mountain mine near Truro and from a small tonnage of the ore treated in an Alumino-Thermit plant near the deposit, produced about four tons of metallic manganese. Early in 1942 operations were discontinued as the supply of aluminum was cut off, but production of the manganese by another process was contemplated.

"In Quebec, deposits of manganese ore occur in the Magdalen Islands; little work was done on the properties in 1941, but further prospecting was planned for 1942.

"In Manitoba, intermittent prospecting was continued on several bog manganese deposits, mainly in the vicinity of Riding Mountain, near Rossburn and Birtle; large or commercial deposits have not as yet been discovered.

"In British Columbia manganese deposits were prospected near Kaslo, Arrowhead, Williams Lake and Nazko; no commercial production was reported.

"Since the outbreak of the war, figures of production for many countries are unobtainable, but there have been marked changes in the flow of supplies. Estimates of world production are in the neighbourhood of 6,000,000 tons annually, the chief producing countries in order of output being Russia, British India, Union of South Africa, Gold Coast (West Africa), Brazil, Egypt and Cuba. Soviet Russia produces close to 3,000,000 tons annually, the output in 1940 being mainly from the Chiaturi deposits in Georgia on the southern slope of the central part of the Caucasus. The mines occur in a 55-square mile area and the deposits are estimated to contain about 160 million tons of 40 to 45 per cent ore. Other deposits in the northern Caucasus and in the Urals are said to contain about 90 million tons of ore. Prior to the German occupation, a large output was obtained from Nikopol, on the Dneiper river, north of the Crimea. Russia was for many years the principal source of supply of high grade manganese ore for the United States, but in 1941 only about 4 per cent of the American imports of the ore came from Russia. India produces close to a million tons of metallurgical grade ore a year, mainly from the Central Provinces, the principal district being Balaghat. Much of the exports of manganese in 1941 from India were taken by Great Britain, and India was also the second greatest source of supply for the United States, the exports to that country being estimated at 240,000 long tons of 50 per cent manganese.

"It is estimated that 95 per cent of the world consumption of manganese ore is used in the manufacture of iron and steel, the ore so used being termed "Metallurgical". The remainder is termed "Chemical". Metallurgical ore is used for making ferromanganese, silico-manganese, and spiegeleisen, in which forms it is added to the steel bath. Manganese is beneficial mainly in improving the workability of the steel, and in improving the product by acting as a deoxidizer, a desulphurizer, and a re-carbonizer. Until recently, about 14 pounds of manganese was used on the American Continent in each ton of steel, but in order to conserve manganese, the average has been reduced to about 11.8 pounds per short ton of steel. Ferro manganese, containing 75 to 82 per cent manganese, is by far the most important addition agent, and to make it, the highest, or "ferro grade" ore is used.

"Ferro grade ore should contain at least 48 per cent of manganese and not more than 7 per cent iron, 10 per cent silica, 0.18 per cent phosphorus, 6 per cent alumina, and one per cent zinc. It must be low in copper, lead, and barium, and the ratio of manganese to iron should not be less than seven to one. The ore should be hard and in lumps of less than four inches, and not more than 12 per cent should pass a 20-mesh screen. Soft ores, such as bog manganese, are objectionable. The United States Metals Reserve Company is buying three grades of ore, that of the above specifications being termed "High Grade". Specifications for "Low Grade A" are: manganese, 44 per cent; aluminium and iron, each 10 per cent; silica, 15 per cent; phosphorus, 0.30 per cent. "Low Grade B" specifications are Mn, 40.0; P, 0.50; Zinc, 1.0, and no maxima for other impurities.

"Specifications of ore required for silico-manganese, used for high silicon alloys and steels, are much the same as for ferro, except that slightly less manganese and considerably more silica is allowed.

"The Canadian market for metallurgical ore is confined mainly to two manufacturers of manganese ferro alloys, one at Welland and the other at Port Colborne, Ontario.

"Chemical grade ores are used mainly in the manufacture of dry batteries. Specifications call for high grade pyrolusite because of its high available oxygen, which acts as a depolarizer. The ore should contain not less than 80 per cent manganese dioxide (MnO_2) and not more than 1.5 per cent iron; 1.0 per cent alumina; 6.0 per cent silica; 0.07 per cent copper; less than 0.05 per cent of any other metal; and 1.0 per cent moisture. It should also be finely ground (85 to 90 per cent through 200-mesh). Canadian requirements of chemical ore range from 3,000 tons to 4,000 tons a year and nearly all of it is used by two manufacturers of dry batteries in Toronto and another in Niagara Falls, Ontario. Chemical ore is used also in the glass and ceramic industries; as paint and varnish driers; as pigments and dyeing materials; and as salts for disinfecting, bleaching, and fertilizers.

"Prices of manganese ore remained fairly steady in 1941. Quotations in the United States are based on a long ton unit (22.4 pounds) of metallic manganese in a 48 per cent or over manganese ore c.i.f. Atlantic ports, exclusive of duty of one-half cent per pound of the metal. Prices in the United States, effective December 19, 1941, on ores under the Metal Reserve Company specifications are as follows: "High Grade" \$36, per long ton of ore, with an increase of 75 cents for each long unit over 48 per cent manganese; "Low Grade A" \$28, plus 65 cents for each unit over 44 per cent manganese; "Low Grade B" \$22, plus 55 cents for each unit over 40 per cent manganese. Each shipment is priced in accordance with the impurities specifications it meets; thus, a 45 per cent manganese ore, with 0.5 per cent phosphorus, would come under "Low Grade B" and not "Low A" which allows a maximum of 0.3 phosphorus. All prices quoted are those delivered to buyers. Canadian prices of imported chemical grade ores, minimum of 80 per cent manganese dioxide are \$60 to \$75 a short ton delivered."

Table 132.—Production (Sales) of Manganese Ore in Canada for Years Specified

Year	Tons	Value	Year	Tons	Value
		\$			\$
1915.....	201	9,360	1932-1934.....		
1916.....	957	89,544	1935.....	100	800
1917.....	158	14,836	1936.....	221	1,596
1918.....	440	6,230	1937.....	85	817
1924.....	584	4,088	1938.....		
1925-1929.....			1939.....	396	3,688
1930.....	273	1,356	1940.....	152	4,315
1931.....	117	2,893	1941.....	*	*

* 7,500 pounds manganese metal produced at the mine from Nova Scotia manganese ore.

Table 133.—Consumption of Manganiferous Ore and Manganese Compounds in Specified Canadian Industries, 1940 and 1941

Industry	Items	Quantity	Value
1940			\$
Electrical apparatus and supplies.....	Manganese dioxide..... pound	6,502,676	197,163
Paints, pigments and varnishes.....	Manganese salts..... pound	50,895	7,899
Steel ingots and castings.....	Ore, manganiferous (foreign)..... pound	58,240	1,300
	Spiegeleisen..... short ton	4,284	150,838
	Ferromanganese..... short ton	17,101	1,464,117
	Silicomanganese..... short ton	2,021	166,286
1941			
Electrical apparatus and supplies.....	Manganese dioxide..... pound	6,245,993	208,806
Paints, pigments and varnishes.....	Manganese salts..... pound	68,623	9,416
Steel ingots and castings.....	Ore, manganiferous (foreign)..... pound	128,000	3,316
	Spiegeleisen..... short ton	5,316	365,656
	Ferromanganese..... short ton	21,250	1,811,031
	Silicomanganese..... short ton	4,518	445,197

NOTE.—In addition to the consumption recorded in the table above, a considerable quantity of manganiferous ore is employed in the manufacture of ferro-alloys. Also, approximately 58 tons of manganese metal was consumed chiefly in the non-ferrous industries in 1940 and 38 tons in 1941.

MERCURY

Production of mercury in Canada is confined to the province of British Columbia. The production of the metal in 1941 totalled 536,304 pounds valued at \$1,335,697, this was the largest annual output ever attained in the Dominion. In 1940 the production amounted to 153,830 pounds worth \$369,317.

The following information is from a report prepared by the Bureau of Mines, Ottawa:

"Cinnabar (HgS), the principal ore of mercury, is a very heavy mineral ($g=8.1$) with a deep cochineal-red colour and scarlet streak, and contains 86 per cent mercury. In Canada, the ore occurs in porous rocks such as altered limestones (ankerite), volcanic breccias or greenstones, and green and purple andesitic lavas. The cinnabar often occurs in veins and stringers of calcite or dolomite within these rocks, and may be associated with stibnite (antimony sulphide) and accompanied by globules of metallic mercury. The presence of mercury can be readily detected by heating a small piece of rock to about 300°C . and placing it between an ultra-violet ray lamp with purple filter and a screen coated with powdered willemite (zinc silicate). If mercury is present, a fume shadow will be cast on the screen. As little as 0.02 per cent mercury can be detected in this manner, but better results are achieved with a powdered sample.

"The only known deposits of cinnabar in Canada are in British Columbia, by far the most important development being that on the north-west side of Pinchi Lake, Omineca Mining Division, about 40 miles north of Vanderhoof station on the Canadian National Railway. The deposit was discovered in the summer of 1937 by J. G. Gray of the Geological Survey, Ottawa, and claims were staked in May, 1938, by A. J. Ostram and others. Late in that year they were optioned to Consolidated Mining and Smelting Company. Prospecting disclosed large cinnabar-bearing areas in veins and impregnations mainly in dolomitized and brecciated limestone along zones of fracturing and shearing. A roasting and condensing plant was erected, and production was started in June, 1940. The grade of ore treated is about 0.5 per cent mercury. The deposit, which is on a steep mountain side, has been developed by adits at a number of different levels and the capacity of the plant has been periodically increased. Prior to the discovery of the Pinchi Lake deposits, little mercury was produced in Canada and their successful operation has brought about a complete change in the Canadian situation in respect to the metal. The output is now far in excess of the domestic requirements and the ore reserves are estimated to be sufficient to assure continuous output at the present rate for several years.

"A number of cinnabar claims have been staked on both sides of Yalakom river, about the mouth of Shulaps creek, 30 miles northwest of Lillooet. The Red Eagle group, staked in 1937 by C. J. Parker, has changed hands several times and is now being worked by John Thompson of Moha. Ore was treated in a small crushing unit and a retort, and two or three flasks of mercury was produced in 1941. At the property of Empire Mercury Mines Limited, 16 miles north of Minto City, in the Bridge River area, about 20 flasks of mercury was produced in 1939-1940 in a 10-ton Gould furnace and condenser system erected on the property. The ore occurs in small pockets in a purple andesitic lava, but it was found that the average grade was too low and the property has been idle since March 1940.

"A number of deposits are known to occur on both sides of the western end of Kamloops lake. The original discovery at Copper creek on the north shore of the lake was worked in 1894, and during the next three years, about 138 flasks was produced, and five more between 1924 and 1927. From then until 1940, all these properties have been idle, but there has been considerable prospecting and re-staking of claims during the past two years. Frank L. Gorse of Kelowna now owns most of the old Copper Creek claims and has opened up some interesting showings of cinnabar and intends to erect some retorts in the near future. Some tunnelling and stripping was done in the Hardie Mountain group, two miles north of Copper Creek Station by Gordon F. Dickson, D. B. Sterrett and others; some zones of ore averaging about 0.35 per cent mercury and fairly large zones of lower grade were discovered. Early in 1942 a deal was made with the Granby Copper Company to explore this property and put it into production if found satisfactory. Mr. Dickson also did some more prospecting in the Tunkwa lake property, 15 miles south of Savona, from which a flask or two was produced in 1940.

"Prospecting work was carried out on the Golden Eagle group on the east side of the Yalakom river, opposite the Red Eagle group. Exploration work is being conducted in various parts of the province by some of the large mining companies: The Consolidated Mining and Smelting Company, The Hollinger Exploration Company and the Bralorne Mines Limited are prospecting the area 50 to 100 miles northwest of the Pinchi lake mine. Several discoveries have been made, such as the Small claims on Silver creek, 18 miles east of Takla Landing, near Indata lake and others, which are not at present spectacular, but are of interest since they are more or less on the strike of the Pinchi cinnabar showings. Cinnabar float has been found in the Shulaps mountains, north of Bridge River and is being followed up.

"Many of the mercury deposits in British Columbia were examined and reported upon in 1941 by officers of the Federal Bureau of Geology and Topography, Department of Mines and Resources. Details are given of all known occurrences of mercury in "Mercury Deposits of British Columbia" (Bulletin No. 5, 1940), by J. S. Stevenson of the B.C. Department of Mines, Victoria.

"World production in recent years is estimated to be slightly in excess of 5,000 metric tons a year. For many years Italy and Spain have shared honours as the leading producer and prior to the war they accounted jointly for 70 per cent of world output, while the United States contributed about 15 per cent. Mexico, Russia and Czechoslovakia are also producers of mercury.

"Mercury enters into the manufacture of acetic acid and anhydride, acetone, chlorine, and caustic soda, which are required for manufacturing military supplies. In the past, an appreciable amount of the metal was consumed as fulminate of mercury, a powerful detonator, but this has been replaced by other compounds such as lead azide, and only a small quantity of mercury is now used for a special type of detonator. Mercury is also used in the manufacture of electrical and chemical apparatus, thermometers, pharmaceuticals and various other equipment and products. Relatively large quantities are also used in the extraction of gold from ores.

"The New York prices for the iron flask of 76 pounds of mercury averaged \$75.00 in 1938, and \$104.00 in 1939. By January, 1940, the price had increased to \$142.00 and following the entry of Italy into the war it reached \$202.00. The price rose from \$167.00 in January, 1941, to \$200.00 in December with an average of \$186.00 for the year. Early in 1942 it was \$198.00, but on the Pacific coast a price ceiling was set at \$191.00. Imports of mercury into Canada from the United States are not subject to duty, but have a sales and war tax amounting to 18 per cent of the value in Canadian funds. The present price of Canadian mercury is largely governed by that of the United States."

Table 134.—Production of Mercury in Canada

Year	Flasks	\$	Year	Pounds	\$
1895.....	71	2,343	1938.....	760	760
1896.....	58	1,940	1939.....	436	1,226
1897.....	9	324	1940.....	153,830	339,317
1924-1927 (a).....	5	(a)	1941.....	536,304	1,335,697

(a) Data from a report issued by Bureau of Mines, Ottawa value not recorded.

Table 135.—Consumption of Mercury in Specified Canadian Industries, 1939-1941

	1939	1940	1941
	(Pounds)		
Medicinals and pharmaceuticals.....	20,473	30,246	67,607
Heavy chemicals (catalyst).....	58,954	30,904	35,319
Electrical apparatus.....	2,161	1,899	25,738
Non-ferrous smelters.....	857	1,636	4,635
Petroleum refineries.....	359	328	920
Gold mines.....	6,313	6,000	11,091
Ammunition.....	.....	4,630	8,217
Other industries.....	500	.....	2,591
Total Accounted For.....	89,617	75,643	156,118

MOLYBDENITE

Production of molybdenite concentrates in Canada during 1941 totalled 196,600 pounds valued at \$88,470 compared with 22,251 pounds worth \$10,280 in 1940. Production in 1941 represented molybdenite concentrates produced at the Moss mine, Quebec, by the Quyon Molybdenite Company; these concentrates were used at the mine in the manufacture of molybdenic oxide.

Owing to the entire lack of market throughout the year for Canadian molybdenite concentrate, there was only a little prospecting and development work carried out on a few properties in Quebec, Ontario and British Columbia. Early in 1941 the property of the Quyon Molybdenite Company was taken over by J. Poulin of St. Lambert, Que.

"World production in 1939 (1940 and 1941 not available), was 16,500 tons of metallic molybdenum, of which 91 per cent came from the United States. In 1941, the United States produced concentrate containing about 20,500 tons of the metal, against 17,200 short tons in 1940. The Climax Molybdenum Company, the world's largest producer, at Climax, Colorado, contributed about 67 per cent of the 1940 United States output. Most of the remainder was obtained as a by-product in the treatment of copper ores.

"Molybdenum is being used to an increasing extent in many fields, but chiefly in steel to intensify the effects of other alloying metals, particularly nickel, chromium, and vanadium; the molybdenum content of these steels generally being only from 0.15 to 0.4 per cent, but in some instances considerably higher.

"Molybdenum alloys are widely used for the hard-wearing and other important parts of aeroplanes, such as in seamless steel tubing, and in the hollow steel propeller blades. They are used also in the manufacture of shell steels; in armour plating; and in high grade structural steels, stainless steels, etc. Molybdenum-vanadium high-speed tool-steels are in some instances, replacing high tungsten high-speed steels with resulting greater efficiency and in other cases molybdenum is being used successfully in combination with the tungsten. Owing to the recent curtailment and cutting off of supplies of tungsten, obtained mainly in China and Burma, this substitution of molybdenum for tungsten has greatly increased, with corresponding increase in the demand for molybdenum. The use of molybdenum in cast iron has much increased in recent years. A magnetic alloy for permanent magnets contains 30 per cent of molybdenum combined with cobalt and iron. Much molybdenum wire and sheet is used in the radio industry, and new alloys suitable for electrical contacts and for heating elements contain molybdenum. The chemical applications of the metal continue to increase. Molybdenite is a very efficient lubricant for bearings subjected to high temperatures in which oils break down.

"The price at New York of 90 per cent molybdenite concentrate is nominally 45 cents (49 cents in Canadian funds) a pound of contained molybdenum sulphide, but the duty on ore or concentrate into the United States is 35 cents a pound of the metallic molybdenum contained therein (about 20 cents a pound for a 90 per cent concentrate). The price of molybdenite in England is nominally 48 cents a pound (50 shillings a long ton unit) f.o.b. English port.

"In May, 1940, the British Government stopped issuing import licences for Canadian molybdenite concentrate or compounds. The action was taken as the result of an arrangement with United States producers whereby Great Britain agreed to take their surplus so as to obviate the danger of supplies reaching the Axis countries or to countries friendly thereto. At that time this surplus was more than sufficient to meet British needs. Early in 1942, however, the British Ministry of Supply intimated that they would take Canadian molybdenite. At the present low price of less than 50 cents a pound delivered in England, few, if any, operators in Canada could make a profit. Prospective producing localities are outlined earlier in this Review but unless production is stimulated by sufficiently raising the price or by other means, exports of Canadian molybdenite to England will be unlikely." (Bureau of Mines, Ottawa).

Table 136.—Production of Molybdenite in Canada, 1902-1941

Year	Ores treated	Ores and concentrates shipped		MoS ₂ content of shipments
	Tons	Tons	Value (a)	Pounds
			\$	
1902.....	(c) 3	3.3	400	(b)
1903.....	(c) 600	85.0	1,275	(b)
1904-1913.....				
1914.....	(c) 166	16.5	2,063	3,814
1915.....	216	39.0	28,920	29,210
1916.....	9,100	610.0	188,316	156,461
1917.....	22,605	1,554.3	320,006	330,316
1918.....	33,935	461.3	428,807	378,482
1919.....	6,783	46.0	69,203	83,002
1920-1923.....				
1924.....	668	10.0	9,370	18,739
1925.....	2,779	15.3	11,176	22,350
1926.....	4,490	12.6	10,472	20,943
1927.....				
1928.....				
1929.....	2,900	9.5	6,400	16,150
1930.....				
1931.....	12	0.61	280	1,222
1932-1936.....				
1937.....	5,307	8.25	8,147	(b)
1938.....	(b)	6.5	4,500	(b)
1939.....	1,492	1.3	816	(b)
1940.....	3,936	11.1	10,280	(b)
1941.....	28,100	98.3	88,470	173,991

(a) Value as given by the operators.

(b) Not known.

(c) Mined.

PITCHBLENDÉ

Pitchblende, the ore from which radium products are made, is mined in Canada only in the Great Bear district of the Northwest Territories. Eldorado Gold Mines Limited continued in 1941 as the only Empire source and the principal world producer of radium compounds.

A report prepared by the Bureau of Mines, Ottawa, states:

"Most of the world production of radium and uranium ores has come from the Belgian Congo, Canada, and the United States. The American material consists mainly of low-uranium carnotite, found mainly in Colorado and Utah, and now mined chiefly for its vanadium content, the present recovery of uranium and radium being small. Ores of the Belgian Congo are mainly a complex assemblage of secondary uranium minerals resulting from the weathering of original pitchblende. The remainder of the world production has come mostly from Czechoslovakia, Portugal, England, Australia, and Russia, but the deposits in most of these countries are small and low-grade and are of minor importance at present.

"Although its fields of uses are increasing, radium continues to be used chiefly in the treatment of cancer. It is recovered in the form of the bromide salt of 90 per cent purity and is usually converted into sulphate for hospital use. When so used, the salt is loaded into fine gold or platinum-iridium needles containing usually one to ten milligrams of radium element. Larger dosages are given by means of so-called radium "bombs", containing up to five and ten grams of the element. Radium is also employed at certain clinical centres for the production of radon, or radium emanation, a heavy gas of short-lived radioactivity, which is used in a form of cancer treatment. Because of its high cost, much of the radium used in hospitals for research, etc., is hired or loaned either from the producers or from loan firms. The current rate for leased radium in the United States is stated to be about 40 cents a milligram a month. Radium is used in place of X-rays in engineering radiography to detect flaws in heavy castings and welds, and its employment in this field has been increasing rapidly in the heavy industries. It is used in self-luminous paints for clock, watch, and compass dials, aircraft instruments, boards, and panels, and for gun-sights, etc.

"Uranium, the heaviest known element, is used chiefly in the form of various salts, mainly the oxide and sodium uranate, which are employed as colouring agents in the ceramic industry.

"Prices for radium are not openly quoted, sales being mostly in lots of one gram or less, and are by individual tender. Before Canada became an important producer the price was about \$60.00 a milligram. Nominal quotations in the United States in 1940-41 ranged between \$20 and \$30 a milligram, American imports in 1940 being valued at about \$25 a milligram. Radium for sale in Canada was quoted in 1941 at \$30 to \$33 a milligram.

"The price of sodium uranate in 1941 remained at \$1.65 per pound; of the black oxide at \$3.00 per pound; and of uranium nitrate at \$2.36 per pound, all prices in United States dollars."

Table 137.—Canadian Refinery Production of Radium Compounds

Year	\$	Year	\$
1933 (*).....	247,900	1937.....	876,540
1934.....	159,400	1938.....	1,045,458
1935.....	413,700	1939.....	1,121,553
1936.....	605,500	1940.....	410,176

(*) First production.

SELENIUM

Selenium, although fairly widely distributed, is not abundant in nature. It occurs in association with sulphur, and frequently accompanies the sulphides of heavy metals in the form of selenides. In no case does it occur in quantities large enough to be mined for itself alone.

Selenium production in Canada represents a by-product in the electrolytic refining of blister and anode copper made from Saskatchewan, Manitoba, Ontario and Quebec ores. It is recovered at Copper Cliff, Ontario by the International Nickel Company of Canada, Ltd., and at Montreal East, Quebec, by the Canadian Copper Refiners, Ltd. Canadian production in 1941 totalled 406,930 pounds valued at \$777,236 compared with 179,860 pounds worth \$343,533 in 1940.

World production of selenium is believed to approximate 300 to 500 short tons a year, the United States and Canada being the principal sources of supply.

Small quantities are produced by several countries including Russia, Japan, Rhodesia, and Mexico. It is reported that selenium is now being recovered from the copper-gold-arsenical ores of the Boliden mine, Sweden.

Selenium is at present used chiefly in the glass and pottery industries, both as a colouring agent—as in ruby glass—and to neutralize the effect of objectionable oxides. To a minor extent it is used in the photo-electric cell, or electric eye, which is finding many industrial applications, and in alloying stainless steel for screw and bolt stock, where it develops improved cutting and threading qualities. It is employed to improve the machinability of copper and copper alloys. It has a large potential market in certain rubber compounding industries and is now being used for the vulcanizing and fireproofing of switchboard cables and to increase the resistance of rubber to abrasion, these applications being still subjects of research. Selenium is used in the manufacture of certain kinds of paint and of certain dyes. As selenium oxychloride, it is a powerful solvent of many substances. The use of the metal in the production of improved cutting-tool steels and in the vulcanizing of rubber appears to offer the best opportunities for the expansion of the market. Rapid progress is also being made in the production of high-quality, selenium rectifiers, which require large quantities of selenium.

Selenium is marketed as a black to steel-grey amorphous powder, but cakes and sticks are also obtainable. Among the other products marketed are ferro-selenium, sodium selenite, selenious acid, and selenium dioxide. At the end of 1941 the nominal price per pound for black powdered selenium, New York, was \$1.75.

Table 138.—Production of Selenium in Canada, 1931-1941

Year	Pounds	\$	Year	Pounds	\$
1931 (*).....	21,500	40,850	1937.....	397,227	687,203
1932.....			1938.....	358,929	622,742
1933.....	48,221	70,345	1939.....	150,771	266,714
1934.....	104,924	171,311	1940.....	179,860	343,533
1935.....	366,425	703,536	1941.....	406,930	777,236
1936.....	350,857	621,017			

(*) First commercial production in Canada.

Consumption of selenium in the manufacture of glass in Canada during 1941 was estimated at 4,211 pounds compared with 4,532 pounds in 1940 and 4,243 pounds in 1939.

General statistics on employment, etc., as relating to the production of both selenium and tellurium are included with those compiled for the Canadian non-ferrous smelting and refining industry.

TANTALUM-COLUMBIUM

Neither tantalum nor columbium ores are commercially produced in Canada, however, it is interesting to note that the Department of Mines and Resources, Ottawa, reports that columbite-tantalite has been found in small quantities in a number of feldspar mines in the Dominion.

Ferrocolumbium is used in the manufacture of stainless steels and it has been reported that the pure metal may be utilized in the construction of certain vacuum tubes.

Tantalum is strongly resistant to acid corrosion, is weldable and easily fabricated. It is used in chemical process equipment and electronic tubes. Due to its hardness and high melting point, tantalum carbide is a constituent of hard cutting-tool mixtures. Ferrocolumbium has become an important alloy for the manufacture of weldable high-speed steels.

The United States Bureau of Mines Yearbook for 1940 states:

"Both columbium and tantalum are used indirectly in the manufacture of munitions and to a minor extent directly. Total imports of tantalum ores in 1940 jumped to 490,460 pounds compared with only 56,561 in 1939, the previous high record. Owing to collapse of markets in Europe, tantalum ores from Belgian Congo and other African sources, as well as from Brazil, came to the United States during the latter part of 1940. Such ores substantially augmented available supplies of tantalum, but the fact that they contained more columbium than those from Australia is indicated by a decline in the average value of the imports to less than 53 cents a pound from \$1.47 in the preceding year. Imports of columbium ore, including rather small quantities from other countries than Nigeria, which hitherto has furnished virtually all the imports into the United States, advanced to 595,220 pounds, more than five times the quantity imported in 1939 but substantially less than the annual imports during the preceding 4 years. Early in 1941, the Fansteel Metallurgical Corporation, pioneer domestic producer of tantalum metal, was expanding its North Chicago (Ill.) plant at an estimated cost of \$150,000. Vascology-Ramet Corporation, Jersey City, N.J., a subsidiary, was also expanding manufacturing facilities, according to press reports.

Tantalum metal was quoted in the United States throughout the year at \$160.60 (base) a kilogram for C. P. rod and \$143 for sheet, subject to discounts on volume business. Corresponding figures for columbium metal were \$560 a kilogram for rod and \$500 for sheet. Ferrocolumbium, 50 to 55 per cent, was quoted at \$2.25 to \$2.35 a pound of columbium contained (f.o.b. producer's plant)." These same prices prevailed in June, 1942.

It was reported in May, 1942 that tantalum, the entire output of which is going into vital war uses, has been placed under complete allocation control in the United States by the division of industry operations WPB, effective May 22, 1942.

TELLURIUM

As with selenium, the metal is recovered in Canada as a by-product in the electrolytic-refining of anode copper at Montreal East, Quebec, by Canadian Copper Refiners, Limited, and at Copper Cliff, Ontario by the International Nickel Company of Canada, Limited. The production in Ontario represents the recovery of the metal solely from nickel-copper ores, whereas at

Montreal East the metal originated in copper-gold ores mined in Manitoba, Saskatchewan and Quebec. Commercial production in Canada from all ores totalled 11,453 pounds valued at \$18,394 in 1941 compared with 3,491 pounds worth \$5,607 in 1940.

"Tellurium occurs native and as an essential constituent of several minerals, none of which has been found in commercial quantities. Tellurium-bearing minerals also occur in minute quantities in association with other metallic ores, and the element may be recovered from residues in the refining of copper or lead, and also when sulphuric acid is manufactured from certain forms of pyrites. The potential recovery and production of tellurium are great, but the demand remains small so that the quantity of refined metal produced is small. Ores containing tellurium occur in British Columbia, Saskatchewan, Manitoba, Ontario, and Quebec. The world production is estimated at 40 to 70 short tons a year and Canada and the United States appear to be the main sources of supply.

"Metallic tellurium, until quite recently, was of little industrial importance. Formerly it was used to a small extent in some radio work and it was used also in the photographic arts and for blackening art-silverware. Small quantities are used as a colouring agent in the ceramic industry. More recently industrial research has shown that when alloyed with lead, the tensile strength and toughness of the lead is increased greatly. The use of small quantities of tellurium as a substitute for tin in the lead used for sheathing electric wire cables is reported to improve the resistance of the cables to heat and corrosion. It has also been used for improving and machining qualities of certain steels. Very finely powdered tellurium may be used as rubber-compounding material. Its presence is stated to shorten the time of curing, and to greatly improve the resisting qualities of the product. Tellurium is also used in the steel industry, but so far mainly in an experimental way. A newly patented "daylight lamp" employed tellurium vapor in a tube to fill in certain wave lengths to produce a continuous spectrum." (Bureau of Mines, Ottawa).

A nominal price for tellurium of \$1.75 per pound at New York prevailed throughout 1941.

Table 139.—Production of Tellurium in Canada, 1934-1941

Year	Pounds	\$	Year	Pounds	\$
1934 (*)	5,130	25,599	1938	48,237	82,967
1935	16,425	32,850	1939	2,940	4,769
1936	35,591	62,997	1940	3,491	5,607
1937	41,490	71,777	1941	11,453	18,394

(*) First commercial production in Canada.

In 1941 Canadian steel foundries consumed 185 pounds of tellurium compared with 400 pounds in 1940. White metal foundries used 492 pounds in 1941 against 629 pounds in 1940.

TIN

Metallic tin was commercially produced in Canada from domestic ores for the first time in 1941. Production totalled 64,744 pounds valued at \$33,667. The metal was recovered in British Columbia from British Columbia ores mined and treated by the Consolidated Mining and Smelting Company of Canada Limited.

The Bureau of Mines, Ottawa, in a recent report, stated:

"Tin is widely distributed, but in only a few countries are the deposits sufficiently large for commercial development. Cassiterite (SnO_2) is the only important ore of tin and in the pure state it contains 78.6 per cent of the metal. Stannite, a sulphide of copper, iron, and tin, has little importance as an ore of tin. In British Columbia, stannite is present in the ore of the Snowflake property, near Revelstoke, and cassiterite and stannite have been noted at several other places in the province. The small cassiterite content of the silver-lead-zinc ore of the Sullivan mine, at Kimberley now being recovered from the zinc tailing, is the source of Canada's recently developed production of tin. Cassiterite occurs also in many other places in Canada, but no commercial deposits have so far been found. In the unglaciated parts of Yukon, stream tin has been found in small quantities, but no serious attempt seems to have been made to test the gravels thoroughly for tin.

"The tin concentration plant of Consolidated Mining and Smelting Company at Kimberley commenced operation on March 1, 1941, and has been functioning very satisfactorily. The new plant for the production of refined tin is expected to be in commercial operation in April, 1942. The tin content of the ore is small and the recovery will be proportionately small. The refinery has an annual capacity of 500 tons of metallic tin.

"The tin produced at Kimberley and the small domestic recovery of secondary tin are far from sufficient to meet the Canadian requirements, which in peacetime amounted to about 2,700 tons a year and are now much larger. They were obtained mostly from smelters in the Straits Settlements. The position of the Allied countries in respect to tin has become critical since the capture by Japan of these smelters and of the Malayan tin mines, with the result that the civilian use of the metal is being increasingly curtailed. The search for commercial deposits in Canada has acquired added importance. Data relating to world production of tin are not available at present.

"Because of changing conditions and the wide range in the market value of the metal, no definite statement can be made as to what constitutes payable ore. Most tin ores are too low in grade to be treated directly and accordingly must be concentrated. Concentrates are in most cases purchased on a 60 per cent tin basis and for each unit or fraction above or below 60 per cent the returning charge is reduced or increased. They are subject to penalties if they contain more than one per cent sulphur and 5 per cent iron. Antimony, arsenic, bismuth, copper, lead, and other impurities are not penalized. Consolidated Mining and Smelting Company is prepared to treat tin concentrate at its new smelter at Kimberley to the limit of its relatively small capacity.

"The only other tin smelter on the North American Continent is the new smelter at Texas City, Texas. This Government-sponsored smelter was built by Tin Processing Corporation of New York and has a capacity of 50,000 tons of concentrate a year. It is expected to be ready for operation in April, 1942. Following its entry into the war, the United States took over all the supplies of the metal in that country and specific allocation of tin was taken over by the Director of Priorities."

The prices of tin in New York in 1941 averaged 52.008 cents a pound. The price was fixed in August at 52 cents a pound and remained at that level to the end of the year.

Of the Canadian imports of tin in 1941, 13,222,000 pounds valued at \$7,319,214 came from the Straits Settlements and 3,820,600 pounds worth \$2,115,327 from the United Kingdom.

Table 140.—Consumption of Tin in Canada by Industries, 1939-1941

	1939	1940	1941
		(short tons)	
Brass and bronze foundries.....	129	277	437
White metal foundries.....	1,640	2,087	3,141
Steel foundries (chiefly for tin plate).....	810	1,207	2,346
Iron foundries.....	52	84	224
Galvanizing plants.....		90	50
Jewellery and silverware plants.....	45	64	146
Electrical apparatus plants.....	34	43	56
Miscellaneous industries.....	77	16	36
Total Accounted for.....	2,787	3,868	6,436

Production of secondary tin in Canadian plants in 1941 was estimated at 384,000 pounds compared with 201,969 pounds in 1940.

TITANIUM

Production of titanium ores in Canada during 1941 totalled 12,651 short tons valued at \$49,110 compared with 4,535 short tons worth \$24,510 in 1940. Commercial production of these ores in Canada has been confined for several years to the St. Urbain deposits, Charlevoix County province of Quebec. In 1941 shipments from this area were made by the Baie St. Paul Titanic Iron Ore Company, Canadian Pyrites Limited and J. A. Coulombe and Company Limited. In addition, a few tons of ore from Bourget Tp., Chicoutimi County, were employed for experimental purposes by Titanium Products Corporation. Approximately fifty tons of ore were

mined in Beresford Tp. by the Tremblay Metal Process Limited; this mineral was also used for experimental purposes. Development work on a deposit in Bourget Tp. was carried on by J. F. Gauthier and also by Joseph Peltier and H. Jodoin on deposits located in St. Jerome Parish, Terrebonne County.

"All known occurrences of titanium in Canada of any possible economic interest are in the provinces of Québec and Ontario.

"Ilmenite or titanite iron (FeTiO_3) in commercial quantities and carrying from 18 to 25 per cent of titanium is found at St. Urbain in Charlevoix County, and at Ivry in Terrebonne County, Québec. Rutile (TiO_2), which usually contains 54 to 59 per cent titanium, is found mixed with the ilmenite in parts of one of the St. Urbain occurrences and in sufficient quantities to make it of possible importance for the rutile alone, this being the only known workable deposit of rutile in Canada. Titaniferous magnetite deposits (magnetite carrying 3 to 15 per cent titanium) occur on the Saguenay river, near Lake St. John, and at Bay of Seven Islands, both in Québec, and on the shores of Seine Bay and Bad Vermillion Lake in western Ontario.

"A few thousand tons of ilmenite is shipped annually from the St. Urbain deposits, part of it to Niagara Falls, New York, presumably for use in the manufacture of ferro-titanium, and part of it to plants of the General Electric Company in the United States. No shipments from the Ivry deposits have been reported for several years.

"The world production of titanium ore is estimated at about 260,000 tons of ilmenite, which would yield 115,000 tons of titanium pigment, and 3,000 tons of rutile. India is the principal producer of ilmenite, the other producers being Norway, Malaya, Portugal, and Canada. Brazil is the principal producer of rutile, and Norway is second in importance.

"Commercial uses for titanium in recent years have continued to increase independently of the trend of general business. Ilmenite continues to be used chiefly in the manufacture of white pigment, and it is used to a smaller extent for making ferro-alloys. In metallurgy, titanium is not only an effective deoxidizer and cleansing agent, but also an alloying element. By addition of titanium, chrome-nickel steels are made more resistant to corrosion and chrome-molybdenum steels become easier to weld. In aluminium and sundry non-ferrous alloys, titanium refines the grain and otherwise contributes to better structure. A variety of carbon-titanium alloys are now available. Titanium treated rails are said to be superior to those treated with silicon. In other industries titanium compounds have many different uses. Rutile is used chiefly in welding-rod coatings and in the ceramic industry.

"The shipping situation curtailed supplies of ilmenite from India, but the situation in the United States will be somewhat relieved in 1942 by increased domestic production. Heavy Army and Navy demands for titanium paints and increased consumption of weld-rod coatings compelled many point manufacturers to return to the use of white lead.

"The New York quotation for ilmenite of \$18 to \$20 per gross ton of 50 to 60 per cent TiO_2 , f.o.b. Atlantic seaboard was replaced in February, 1941 with \$28 to \$30 for straight 60 per cent material. The price for rutile 94 per cent TiO_2 remained at 8 to 10 cents per pound of concentrate but the 88 to 90 per cent grades advanced \$10 in April, 1941 to \$95 a ton of concentrate. The price of ferrocen-titanium f.o.b. plant remained at \$142.50 a ton, and metallic titanium at \$5 to \$5.50 a pound throughout 1941."

On November 22, 1941 a General Preference Order M 44 was issued in the United States by OPM to set up a defence pool and direct the distribution of titanium dioxide.

Table 141.—Production of Titanium Ore in Canada (*), 1927-1941

Year	Short ton	\$	Year	Short ton	\$
1927	2,029	8,980	1935	2,288	16,400
1928	2,244	6,732	1936	2,566	18,318
1929	2,748	7,359	1937	4,229	26,432
1930	412	1,239	1938	207	1,449
1931	1,509	10,261	1939	3,694	21,267
1932			1940	4,535	24,510
1933			1941	12,651	49,110
1934	2,023	14,161			

(*) All from Québec.

Table 142.—Consumption of Titanium Pigments in Canadian Paint Industry, 1931-1941

Year	Pounds	Cost at works	Year	Pounds	Cost at works
		\$			\$
1931.....	745,207	89,761	1937 (*).....	3,748,341	362,869
1932.....	691,304	96,759	1938 (*).....	3,903,337	378,548
1933.....	1,061,249	128,969	1939 (*).....	5,088,234	494,914
1934.....	1,710,188	186,678	1940 (*).....	6,138,760	616,360
1935.....	2,513,026	261,506	1941 (*).....	8,971,865	1,004,591
1936 (*).....	2,456,265	269,130			

(*) In 1936 includes 1,396,337 pounds of pure titanium white valued at \$193,638. In 1937 the quantity of pure titanium white totalled 1,299,857 pounds valued at \$193,107 in 1938, 1,341,359 pounds at \$200,552 in 1939, 1,855,288 pounds worth \$275,103 in 1940, 2,297,248 pounds valued at \$344,945, and in 1941, 3,076,490 pounds worth \$560,621.

NOTE.—Neither titanium white nor titanium alloys are commercially produced in Canada.

In 1939 there were 118 tons of ferrotitanium valued at \$23,498 consumed in the manufacture of steel in Canada; in 1940, 118 tons worth \$24,233, and in 1941, 181 tons valued at \$52,128.

TUNGSTEN

Statistics of Canadian tungsten production represent the quantity and value of crude tungsten concentrates shipped to metallurgical or other plants. In 1941 these totalled 82,846 pounds valued at \$38,712 compared with 12,002 pounds worth \$7,303 in 1940. The following information relating to tungsten is from a report prepared by the Bureau of Mines, Ottawa:

"Wolframite, (Fe₂Mn) WO₄, is the principal ore of tungsten, the next in importance being scheelite (CaWO₄) a calcium tungstate. The former is a dark brown to black heavy mineral, which contains 76.4 per cent WO₃ (tungstic oxide) when pure, and is not common in Canada. Scheelite, the chief Canadian ore of tungsten, is a heavy, usually buff, but sometimes white mineral with a dull lustre, which contains 80.6 per cent WO₃ when pure. It is commonly associated with quartz and frequently occurs in gold-bearing veins. It can be detected readily (in the dark) by its brilliant pale bluish-white fluorescence under ultra-violet light and purple filter. These lamps are at present made only in California. All duties into Canada on the lamps have been removed.

"The production of concentrate is small, but shipments were made during 1941 from properties in southeast Nova Scotia; the Val d'Or area, Quebec; the Porcupine area, Ontario; the Bridge River region, south central British Columbia; and from Keno Hill in Yukon.

"In Nova Scotia at the Indian Path mine, near Lunenburg, Guysborough Gold Mines Limited—a subsidiary of Ventures Limited—continued underground development and erected a pilot mill, in which a few hundred tons of ore in the form of bulk samples was treated to obtain rough concentrate. Scheelite-bearing zones were opened up and a 100-ton mill is being erected with a view to production in 1942. Several deposits were prospected along the Waverly anticline, northeast of Halifax. These include the Hyland deposit near Lower Sackville, being developed by J. W. Storer; the Goff property northeast of Bedford, owned by R. E. Kirkpatrick; and the Reynolds property, south of Middle Musquodoboit. Guysborough Gold Mines, Limited, continued to develop the gold-tungsten property on both shores of Lake Charlotte, 30 miles northeast of Halifax. The scheelite is too low grade at present prices and operations were suspended during the summer. Some ore could be produced, however, from this property.

"In New Brunswick, the Burnt Hill wolframite property in York county was actively prospected by Consolidated Mining and Smelting Company Limited between 1912 and 1918. It is expected that arrangements will be made to assure production in 1942.

"Scheelite occurs in many of the gold mines of Quebec and Ontario. Mill samples from all mines equipped with concentrators were recently examined and a detailed investigation was then made, using the ultra-violet lamp, at those mines previously known to contain scheelite or at which it had been discovered in the samples. This work, which is still in progress, was done by officers of the Bureau of Mines, Ottawa, and the Quebec Bureau of Mines in cooperation with mine owners. No large tonnage is expected from any mine, but the total tonnage will contribute appreciably towards domestic requirements. The largest amount of scheelite yet found is at the

Hollinger gold mine, Porcupine area, where a small treatment plant was completed early in 1942. Several other gold mines in this area will probably ship their hand-picked scheelite to the Hollinger mill.

"In Ontario, the gold properties in the West Porcupine, Red Lake, and Long Lac areas are the principal active or potential sources of scheelite.

"In Quebec, the most promising region is north of Rouyn and eastwards to Val d'Or, Abitibi County. Scheelite occurs in quartz veins and in some of the underground workings on the property of Manley Gold Mines, Limited in La Reine township. A little prospecting was done on the occurrence at Kayrand (formerly Nortrac) property northwest of Amos, and also on the claims of the Petosa Syndicate in Gaboury township, east of Ville Marie on Lake Timiskaming.

"In British Columbia, Consolidated Mining and Smelting Company of Canada early in 1942 completed a small mill on the Red Rose property near Hazelton on the Skeena river. Some good grade scheelite ore was disclosed and shipments are expected throughout 1942. This company also took over the Phillips claim, now known as the Tungsten Queen, north of Minto city, in the Bridge River area, from which, during the past two years Mr. Phillips has shipped high grade massive white scheelite to Ottawa for treatment. No work was done on the property of Columbia Tungstens, Limited on Hardscrabble creek in the Cariboo district, but the remainder of the concentrate made in its mill during 1940 was shipped in 1941. Some ore was treated in the underground mill of the Regal Silver mine, now operated by Consolidated Tungsten-Tin Mines, Limited, at Albert Canyon northeast of Revelstoke. The company intends to treat the rough concentrate produced in the small underground mill in the finishing plant being erected alongside the C.P.R. track, 7 miles from the mine. The ore is a complex mixture of scheelite, stannite, and several metallic sulphides. The mill of Consolidated Nicola Goldfields, Limited in the south central part of the province is being equipped to treat the scheelite which occurs in small amounts in the mine.

"The discovery of scheelite in the Bralorne gold mine, Bridge River area, is of interest and its recovery is under investigation. Prospecting was done on scheelite occurrences near Salmo, Nelson mining division; south of Barkerville; east of Hansard, on the Fraser river; and in several other localities. The Provincial Department of Mines, Victoria, is making a thorough investigation of the occurrences of tungsten in British Columbia and arrangements have been made to purchase small lots of scheelite up to 1,000 pounds for which cash will be paid on the spot.

"In the Northwest Territories, Slave Lake Gold Mines Limited, with a property on Outpost Island in Great Slave Lake, shipped some rough concentrate containing ferberite, wolframite, tin, and gold for testing, upon the results of which will depend whether or not a plant will be built. About 50 miles to the north, in the Gilmour lake area, investigation by the Geological Survey, Ottawa, has revealed many quartz veins carrying scheelite; as yet, however, the amount found is small. Several of the gold mining companies are prospecting the area and a mill will be erected if a sufficient tonnage of ore is disclosed.

"In Yukon, the placer holdings of Canadian Tungstens Limited on Canadian Creek, southwest of Selkirk, were acquired by Canbrae Exploration Company, a subsidiary of Bralorne Mines, Limited, and dredging will be undertaken during 1942. The tungsten occurs mainly as wolframite and ferberite with a little scheelite. Several placer deposits containing both wolframite and scheelite on Dublin Gulch and Haggart creek, near Keno, north of Mayo, are being worked by Fred Taylor and by others. Small shipments of the gold clean-up containing a high percentage of the tungsten minerals were made in 1941. Recent tests indicate that these minerals can be separated from each other by screening over 14 mesh. The wolframite is nearly all coarse and most of the scheelite passes through the screen.

"World production of tungsten ore and concentrate in 1939 (figures for 1940 and 1941 not available) on a basis of 60 per cent WO₃, was about 34,000 tons, the principal producing countries being, Burma, China, United States, Bolivia, Portugal, Korea, and Japanese controlled areas in south China.

"China had dominated the tungsten industry for more than 20 years prior to 1939, exports being as high as 18,000 tons annually. The Chinese tungsten (wolframite) deposits are the largest in the world, and the principal deposits are still in unoccupied China.

"Burma for the past two years has been the world's largest producer. Exports were controlled by the British Ministry of Supply and all shipments went to England. Exports in 1940 were 12,000 tons of wolframite and mixed tin-wolframite concentrates, and exports in the first six months of 1941 were 5,100 tons. The principal mines are at Tavoy in the south Burma peninsula and in south Kareni state, about 170 miles northeast of Rangoon. These mines are now in Japanese hands.

"Most of the Canadian tungsten output for the past two years consisted of hand-picked ore shipped to the Bureau of Mines, Ottawa for treatment in the ore dressing plant, in which concentrate of 70 per cent WO_3 or better was made and shipped to Atlas Steel Company, Welland, Ontario.

"Tungsten ores are concentrated to 60 per cent or higher of tungsten trioxide (WO_3). For adding to steel, it is generally converted into ferro-tungsten, but sometimes into tungsten oxide, calcium tungstate, or tungsten powder. At the plant at Welland, Ontario, only scheelite is used at present and the high grade concentrate of not less than 70 per cent WO_3 is added directly to the steel bath. This is possible because of the comparative ease with which the calcium forms a slag.

"United States specifications for scheelite are:— WO_3 —60 per cent minimum, the maxima percentage of the following harmful impurities being; copper and phosphorus each 0.05; arsenic, antimony and tin each 0.10; bismuth, 0.25, molybdenum, 0.40; sulphur, 0.75; and manganese, 1.00. For wolframite (or ferberite), 1.50 tin is allowed and a little more arsenic and bismuth. The ores may be in lumps, fines, or a mixture of both.

"The price in Canada of scheelite concentrate containing 70 per cent WO_3 (within specifications) is \$20.00 a short unit of WO_3 , delivered at Welland, Ontario.

"Tungsten is one of the most important of the war metals, but its production in Canada is insignificant in relation to the steadily increasing amounts required in the manufacture of war products in the Dominion. This, together with the shipping hazards from Asia, the principal source of supply, give particular emphasis to the need for augmenting domestic production. Many gold deposits besides those already mentioned probably contain some scheelite and if so it can be readily detected by means of the ultra-violet lamp."

The price of scheelite on the New York market in January, 1918 was around \$26 per unit; with the signing of the Armistice, business came to a complete stop and there were no quotations.

Table 143.—Production of Crude Tungsten Concentrates in Canada

Year	Pounds	\$	Average per cent WO_3
1912.....	28,000	(a)	72
1917.....	580	234	69.41
1918.....	(c) 27,000	11,700	73.8
1939.....	8,825	4,917	(a)
1940.....	12,002	7,303	70.75
1941.....	(b) 82,846	38,712	51.1

(a) Not recorded.

(b) Includes export of considerable low-grade material to U.S.A.

(c) Included 11 tons produced at Burnt Hill, N.B., with smaller shipments from Yukon, Nova Scotia and Manitoba.

Table 144.—Tungsten Wire Used in the Manufacture of Canadian Electrical Apparatus and Supplies, 1931-1941

Year	Value	Year	Value
	\$		\$
1931.....	79,659	1937.....	52,768
1932.....	53,802	1938.....	50,594
1933.....	48,701	1939.....	52,207
1934.....	48,996	1940.....	62,175
1935.....	52,192	1941.....	82,696
1936.....	47,856		

Table 145.—Tungsten Consumed in Specified Industries, 1938-1941

Year	Ferro-tungsten consumed in Canada in the manufacture of steel		Tungsten metal consumed in Canada in the manufacture of steel and alloys
	Long tons	Value \$	Pounds
1938.....	30	69,806	.....
1939.....	95	173,250	13,089
1940.....	336	829,859	15,474
1941.....	482	1,003,314	29,729

(a) Other than tungsten-chromium.

VANADIUM

Some of the magnetites of the Rainy River district in Ontario are known to contain relatively small quantities of vanadium and some research has been conducted as to its economic recovery. There is no production of either the metal or its ores in Canada at the present time. It was reported in 1942 that interest was being renewed in the possible production of vanadium from Canadian iron ores.

The principal occurrences of vanadium are in Arizona, Colorado, and Utah in the United States; Minasragra in Peru; Broken Hill in Northern Rhodesia; and Grootfontein district in South West Africa.

The metal is employed chiefly in the manufacture of alloy steels and irons. It is also used in the form of ammonia meta-vanadate as a catalyst in the manufacture of sulphuric acid and in the nonferrous, glass, ceramic and colour industries. Canadian steel furnaces used 51 tons of ferrovanadium in 1940; this was valued at \$130,566.

"The Mineral Industry" reported that the trend toward higher vanadium content in high speed steels had continued vigorously and in recent months (1940) has been given great impetus by lack of sufficient tungsten to meet all the requirements of the National Defense program, with the resultant change to high speed tool steels of the molybdenum and molybdenum-tungsten types. In many cases, steels of these compositions require higher vanadium contents to restrict growth during heat treatments that are required to ensure maximum cutting capacity.

Possible imports of vanadium or vanadium ores into Canada are not shown separately in Canadian trade reports. "Metal and Mineral Markets"—New York—quoted ferrovanadium June, 1941—per pound of vanadium contained, delivered \$2.70 to \$2.90. Vanadium ore per pound V_2O_5 contained, 27½ cents f.o.b. shipping point. These same prices were quoted in June, 1942.

In 1940 there were 57 long tons of ferrovanadium valued at \$130,566 consumed in Canada in the manufacture of steel, and in 1941 a total of 182 tons at \$438,639.

ZIRCONIUM

The metal is not produced in Canada; zircon is the most common zirconium mineral and the Department of Mines and Resources, Ottawa, states that it, or cyrtolite, commonly occurs in greater or less amount in Canadian Precambrian pegmatites, also in the pegmatitic apatite-phlogopite deposits of the Grenville areas in Ontario and Quebec.

Zircon is used to a steadily growing extent in refractories, specialized porcelains and heat-resisting glass. The United States Bureau of Mines Yearbook for 1940 reports on the metal as follows:

"Metallic zirconium is employed as powder or ductile metal in photo-flash bulbs, radio-transmitter tubes, ammunition primers, spot welding electrodes, and a variety of other applications. According to information furnished by the Foote Mineral Co. (1609 Summer St., Philadelphia, Pa.), this metal has a unique combination of high corrosion resistance and ability to absorb large volumes of certain gases. Below 100° C., the metal is immune to attack by some of the most corrosive agents known. At 500° to 860° C. it can absorb great quantities of hydrogen and at higher temperatures oxygen, nitrogen, carbon monoxide, carbon dioxide, and other gases. Zirconium, accordingly, is particularly well suited as a "getter" in vacuum tubes and chemical processes to improve and maintain high vacuum. In steelmaking, zirconium acts as a scavenger and deoxidizer, removing nitrogen and oxygen as well as nonmetallic inclusions. In the range 0.08 to 0.10 per cent zirconium the improvement in grain is marked, and above 0.15 per cent the zirconium combines with sulphur to produce a better surface on high-sulphur steels. Cast nickel-silicon bronze and other nonferrous alloys may benefit by additions of zirconium.

"Engineering and Mining Journal quotations, June, 1942, were: Zircon ore, 55 per cent ZrO_2 , f.o.b. Atlantic seaboard, carloads, \$70 a short ton. Zirconium metal, commercially pure, powdered, \$7 a pound. Zirconium alloys, 12 to 15 per cent Zr, 39 to 43 per cent Si, \$102.50 to \$107.50 a gross ton; 35 to 40 per cent Zr, 42 to 52 per cent Si, 14 and 16 cents a pound. These quotations are the same as those in 1939."

There was no commercial production of zirconium minerals in Canada in 1941. Canadian imports of zirconium silicate in 1940 were valued at \$12,795 and those of zirconium oxide at \$65,688. Consumption of ferro-zirconium in 1939 in the manufacture of steel in Canada totalled 21 tons valued at \$2,122; the corresponding consumption in 1940 was 1 ton valued at \$93, and in 1941 it was 40 tons at \$1,647.

Table 146.—Principal Statistics (*) of the Miscellaneous Metal Mining Industry in Canada, 1940 and 1941

	1940	1941
Number of firms.....	36	46
Capital employed (†).....	\$ 2,720,642	2,931,695
Number of employees—On salary.....	71	78
On wages.....	374	647
Total.....	445	725
Salaries and wages—Salaries.....	\$ 113,482	149,149
Wages.....	\$ 514,543	992,095
Total.....	\$ 628,025	1,141,244
Value of production (gross).....	\$ 2,029,278	3,428,886
Cost of fuel and electricity.....	\$ 235,861	359,005
Process supplies used.....	\$ 86,797	217,494
Smelter charges.....	\$ 364,533	545,160
Freight.....	\$ 32,982	233,904
Value of production (net).....	\$ 1,309,105	2,073,323

(*) Does not include data relating to smelters and refineries or to mining in the Northwest Territories.

(†) Exclusive of ore reserves.

Table 147.—Capital Employed in the Miscellaneous Metals Mining Industry in Canada, 1941

	\$
Present cash value of the land (excluding minerals).....	134,847
Present value of buildings, fixtures, machinery, tools and other equipment.....	2,341,932
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	169,270
Inventory value of finished products on hand.....	5,723
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	279,923
Total.....	2,931,695

Table 148.—Employees, Salaries and Wages in the Miscellaneous Metal Mining Industries in Canada, 1941

	Number of employees		Salaries and wages
	Male	Female	\$
Salaried employees—			
Total.....	75	3	149,149
Wage-earners—			
Surface.....	447		992,095
Underground.....	114		
Mill.....	86		
Total.....	647		992,095
Grand Total.....	*725	3	1,141,244

* Includes the 3 female employees.

Table 149.—Average Number of Wage-Earners Employed, by Months, 1940-1941

	1940	1941		
		Surface	Under-ground	Mill
January.....	296	305	66	44
February.....	253	294	72	49
March.....	244	335	103	63
April.....	307	338	100	95
May.....	370	398	106	95
June.....	390	498	109	97
July.....	435	527	128	94
August.....	417	558	121	97
September.....	450	586	142	94
October.....	475	543	153	103
November.....	410	508	160	106
December.....	368	440	142	77

CHAPTER SIX

THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA

The Non-Ferrous Smelting and Refining Industry, as defined by the Dominion Bureau of Statistics, Ottawa, comprises those firms engaged primarily in the smelting of non-ferrous ores or concentrates and the refining of metals recovered therefrom.

The value added by the industry in the processing of crude or semi-crude material during 1941 totalled \$119,736,294 compared with \$98,059,287 in the preceding year. Refined products included gold, silver, copper, nickel, lead, zinc, aluminium, tin, magnesium, antimony, bismuth, cobalt, indium, cadmium, selenium, tellurium, radium salts, uranium compounds and sulphur; other end products of individual plants or companies were copper-nickel matte, cobalt salts, nickel salts, nickel and cobalt oxides, arsenious oxide, sulphuric acid, platinum metals residues, zinc dust, zinc oxide, and blister and anode copper.

The value added by the industry in the treatment of various ores and metals in 1941 represents an all-time high record and reflects the magnificent effort of the Canadian miner and metallurgist in supplying the Allied Nations with essential war supplies. It is worthy of note that in 1941 primary metallic tin was produced commercially in Canada from domestic ores for the first time; magnesium powder was also a product of Canadian metallurgical plants during the year under review. Not included in the products credited to the non-ferrous smelting and refining industry was an important production of quicksilver in British Columbia. This metal is produced at or near the mines and statistics relating to its production are included with those of the miscellaneous metal mining industry. The production of chrome-bearing ferro-alloys in Ontario, principally from foreign ores, is classified under manufacturing and the data relating to same are, therefore, not included in this survey.

The cost of ores, concentrates and other material, treated during 1941 was estimated at \$213,542,005 compared with \$174,274,655 in 1940; fuels and purchased electricity consumed totalled \$26,771,809 and the value of chemicals and various other process supplies used amounted to \$19,272,162.

Capital employed by the industry in 1941 was reported at \$309,963,342, which figure includes value of land, plant, materials on hand and in process, finished products and operating funds. Employees totalled 16,014 and salaries and wages paid aggregated \$27,482,689, as against \$21,766,197 in 1940.

Table 150.—Principal Statistics of the Non-Ferrous Metallurgical Industry in Canada, 1939 to 1941

	1939	1940	1941
Number of companies.....	9	9	9
Number of plants.....	13	13	13
Capital employed.....	\$ 192,186,465	234,826,742	309,963,342
Number of salaried employees.....	1,089	1,558	1,750
Salaries.....	\$ 2,670,414	3,661,048	4,117,393
Number of wage-earners.....	11,360	11,908	14,264
Wages.....	\$ 16,701,705	18,105,149	23,365,291
Value of plant products (gross) (†).....	\$ 262,602,495	305,360,547	379,322,270
Estimated cost of ores, concentrates, etc., treated (a).....	\$ 154,879,498	174,274,655	213,542,005
Cost of fuel and purchased electricity (b).....	\$ 15,891,301	19,510,664	26,771,809
Process supplies, other than items (a) and (b).....	\$ 11,773,863	13,515,941	19,272,162
Value added by smelting (net).....	\$ 80,057,833	98,059,287	119,736,294

(†) The gross value of production should not be interpreted as the ultimate sale value of finished metal only, as it represents the combined values of all industry (smelting, refining, etc.) and products (blister copper matte, etc.) and in this sense is a duplication of values.

Table 151.—Capital Employed in the Non-Ferrous Smelting and Refining Industry in Canada, 1941

	\$
Present cash value of the land (excluding minerals).....	3,240,391
Present value of buildings, fixtures, machinery, tools and other equipment.....	178,493,369
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	44,789,379
Inventory value of finished products on hand.....	4,699,640
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	78,740,563
Total.....	309,963,342

Table 152.—Number of Wage-Earners, by Months, 1932 and 1939-1941

Month	1932	1939	1940	1941
January.....	5,496	11,138	11,225	12,927
February.....	5,400	11,123	11,297	13,052
March.....	5,355	11,334	11,298	13,102
April.....	4,750	11,371	11,403	13,617
May.....	4,297	11,380	11,691	14,275
June.....	4,475	11,390	11,794	14,503
July.....	4,205	11,486	12,102	14,634
August.....	4,160	11,476	12,256	14,788
September.....	4,198	11,454	12,251	14,815
October.....	4,326	11,327	12,316	14,995
November.....	4,316	11,401	12,481	15,055
December.....	4,274	11,424	12,771	15,371
Average.....	4,604	11,360	11,908	14,264

Table 153.—Capacities of Canadian Copper Smelting and Refining Works, 1941 (a)

Company	Blast furnaces		Reverberatories		Converters
	Number	Annual capacity—tons of ore and concentrates	Number	Annual capacity—tons of ore and concentrates	Number
Consolidated Mining & Smelting Co. of Canada, Ltd. (b).....			1	75,000	2
Falconbridge Nickel Mines, Ltd.....	1	400,000			3
Hudson Bay Mining & Smelting Co., Ltd.....			1	420,000	2
Noranda Mines, Ltd.....			2	1,100,000	4
International Nickel Co. of Canada, Ltd.....	4	800,000	7	2,800,000	24
Electrolytic Copper Refineries				Annual Capacity—short tons	
				1940 (a)	1941
Canadian Copper Refiners, Ltd.....				112,000	(c)
International Nickel Co. of Canada, Ltd.....				150,000	(c)

(a) American Bureau of Metal Statistics. Some additions to capacity have been made since 1940. (b) Idle. (c) Not reported but it is understood that capacity was increased in 1941.

COPPER REFINING CAPACITY OF THE WORLD†

Copper refining capacity of the world, covering both electrolytic and furnace methods, at the end of 1940 was estimated at 3,241,000 short tons, whereof 1,549,000 was electrolytic capacity in the United States, besides which there was the capacity of the Lake Superior smelting works and the capacity of the plants treating only old material. In 1941 there was a slight increase in American electrolytic capacity, and some increases in Canadian and in the Chilean. The production of refined copper in Chile during the last quarter of 1941 was 120,000 tons, indicating an annual capacity at the rate of 480,000 tons.

(†) These data supplied by the American Bureau of Metal Statistics.

Table 154.—Lead Smelting Capacity of Canada (*) (at end of 1938)

Company	Situation of plant	Number of blast furnaces	Annual capacity tons of charge
Consolidated Mining & Smelting Company of Canada, Limited.....	Trail, B.C....	5	700,000

(*) American Bureau of Metal Statistics, 1941.

LEAD REFINING CAPACITY OF THE WORLD*

An estimate of the lead refining capacity of the world outside of North and South America has been becoming increasingly uncertain. No data have been received from Russia for a good many years. Official data for 1938 were not received from Spain, Germany and Japan; and for 1939 there was an absence of communication from other countries besides them. For 1940 there were the same absences, plus silence from Australia, Burma and Canada. Our latest data are to be regarded, therefore, as being of the end of 1938, with some corrections for the end of 1940. Inasmuch as the nominal capacity was then materially in excess of any annual production in recent years it is probable that no substantial additions have had to be made in either 1939 or 1940, and certainly there have been no reports of construction of new plants. It is certain moreover that the listing of the plants at the end of 1938 was exaggerated and in excess of what should be reported as useful and effective, the remainder being obsolete, incapable of economical ore supply, or otherwise useless. For example, Spain would probably have no use for its listed capacity, or anything like it; likewise as to some positions elsewhere. With this explanation the data for countries outside of the United States are as follows, in metric tons, the total being 1,992,300:

Table 155.—Lead Refining Capacity of the World, by Countries

Canada.....	181,400	France.....	141,700	Roumania.....	7,000
Mexico.....	293,900	Germany.....	207,000	Spain.....	263,300
Argentina.....	18,000	Greece.....	3,000	Burma.....	93,000
Peru.....	40,000	Great Britain....	160,700	Japan.....	20,000
Austria.....	9,000	Italy.....	71,000	Turkey.....	6,000
Belgium.....	137,000	Yugoslavia.....	40,000	Tunis.....	37,000
Bohemia-Moravia.	5,500	Poland.....	54,800	Australia.....	203,000

The estimated lead refining capacity of the United States was 1,128,000 short tons at the end of 1941, divided in the ratio of 361,000 tons in Missouri and 767,000 tons elsewhere. This compares with a total of 1,068,000 tons at the end of 1940. The actual production from primary refineries in 1941 was 623,344 tons, indicating that the listing of domestic capacity is excessive, especially as to the Missouri capacity. In the accounting for American capacity the data from individual producers are accepted as given by them, and no doubt there is a tendency toward exaggeration. While there might be a surplus of capacity in some area there might be a shortage in another, which might have an important bearing in respect of the smelting and refining of imported ore, etc.

Table 156.—Capacity and Production of Electrolytic Zinc Plants in Canada, 1938-1941 (*)

Company	Maximum H.P. rating	Estimated annual capacity for cathode zinc	Actual production as ingot zinc (short tons)			
		(short tons)	1938	1939	1940	1941
	(a)	(b)				
Consolidated Mining & Smelting Co. of Canada, Ltd.....	72,000	146,000	133,242	(c)	(c)	(c)
Hudson Bay Mining & Smelting Co., Ltd.....	22,500	43,000	38,414	38,790	(c)	(c)

(*) These data supplied by the American Bureau of Metal Statistics.

(a) Expressed as power in terms of direct current after transforming the alternating current in sub-station at the works.

(b) Capacity for ingot zinc may be reckoned at 95 per cent capacity for cathode deposition.

(c) Not recorded.

The zinc smelting capacity of the United States at the end of 1941, outside of what exists in graphite retorts for resmelting scrap and manufacturing by-products, is estimated by the American Bureau of Metal Statistics at 950,000 tons, or about 79,000 tons per month. At the end of 1940, the estimated capacity was 787,000 tons. Of the estimated capacity at the end of 1941, about 492,000 tons were in 13 plants treating sulphide ore, the remainder being four electrolytic plants, four plants using continuously operated vertical retorts, and in plants using horizontal retorts for distilling the willemite ore of New Jersey.

Except for plants in the United States, no data are available as of the end of 1941. At the end of 1939, the American Bureau of Metal Statistics estimated the effective capacity outside of United States at about 1,212,000 metric tons, whereas about 330,000 tons were in Australia, Canada, Rhodesia and Great Britain. Since 1939, there have been some increases in these capacities. On the other hand, a good deal of metallurgical capacity in Continental Europe has become useless through deprivation of ore supplies.

CHAPTER SEVEN

THE COAL MINING, COKE, NATURAL GAS AND PETROLEUM INDUSTRIES
(Fuels) IN CANADA

The Coal Mining Industry in Canada.

The Coke and Gas Industry in Canada.

The Peat Industry in Canada is included under miscellaneous non-metals, chapter 8.

The Petroleum Industry in Canada.

1. Production of Crude Petroleum.
2. Production of Petroleum Products.

NOTE:—In order to correlate data regarding fuels in Canada, this chapter has been prepared to include statistics of the coal, natural gas, peat and petroleum industries. This survey presents information regarding these industries as a whole, dealing principally with the mineral industry, although supplementary data are shown for closely allied manufacturing operations.

The Bureau issues an annual report on Coal Statistics for Canada which may be referred to for complete details of the Coal Mining Industry.

THE COAL MINING INDUSTRY

Canadian coal mines produced 18,225,921 tons of coal valued at \$58,059,630 in 1941; in the preceding year, 17,566,884 tons worth \$54,675,844 were produced. Bituminous coal output during 1941 amounted to 13,603,307 tons, sub-bituminous 585,453 tons and lignite 4,037,161 tons.

Nova Scotia's output declined 6 per cent in 1941 as compared with the previous year and aggregated 7,387,762 tons. Production from New Brunswick mines was lower by 4.5 per cent and totalled 523,344 tons. Manitoba produced 1,246 tons as compared with 1,697 tons in 1940. Saskatchewan operators reported an output of 1,322,763 tons or 20.6 per cent above the previous year's total of 1,097,517 tons. Alberta's production totalled 6,969,962 tons, made up of 3,671,357 tons of bituminous coal, 585,453 tons of sub-bituminous coal and 2,713,152 tons of lignite coal. In 1940 Alberta mines produced 6,203,839 tons, consisting of 3,069,206 tons of bituminous coal, 598,686 tons of sub-bituminous coal and 2,535,947 tons of lignite coal. An 8 per cent increase was recorded in British Columbia's output of 2,020,844 tons. No coal has been produced in the Yukon since 1938.

Canadian coal exported in 1941 amounted to 531,449 tons, an increase of 5.2 per cent over the exports of the previous year. Ports in Nova Scotia, New Brunswick, Quebec and Central Ontario cleared 355,662 tons of Canadian coal and exportations through western ports reached 175,787 tons. Canada re-exported foreign coal in 1941 to a total of 49,558 tons compared with 55,584 tons in 1940.

Imports of coal into Canada in 1941 were 24 per cent higher at 21,808,861 tons. Anthracite imports amounted to 3,940,859 tons and consisted of 3,310,670 tons from the United States and 630,189 tons from Great Britain. The United States supplied 84 per cent of the Canadian anthracite requirements in 1941 compared with 66.7 per cent in the preceding year. Great Britain supplied 16 per cent of Canada's requirements of this coal during the year as against 33.3 per cent in 1940 and 31.8 per cent in 1937. Receipts of bituminous coal totalled 17,867,068 tons or 31.6 per cent above the 1940 total. Lignite coal imports amounted to just 934 tons in 1941.

Employment was furnished by Canadian coal mines to 24,980 wage-earners, on the average; in 1940, the average number of those employed was 25,128. Mines in Nova Scotia and New Brunswick employed 14,251 wage-earners during the year while those in the western provinces employed 10,729. Surface workers averaged 287 days of work in 1941, and underground workers 261. In addition to these men, there were 1,350 men on the mine pay-rolls. All employees working in or about the Canadian coal mines received salaries and wages totalling \$38,149,602 in 1941, compared with a total pay-roll of \$34,043,162 a year ago.

Coal made available for consumption in Canada during the year amounted to 39,503,333 tons or 14 per cent above the tonnage made available in 1940. These figures do not represent the quantity consumed during the year but are the actual tonnages of new coal made available for use and are calculated by subtracting the exports from the production and adding the imports.

In addition to coal consumption, Canada's fuel requirements include coke, natural and artificial gas, fuel oil, wood and electricity, all of which are used for both industrial and domestic purposes.

Table 157.—Capital Employed in the Coal Mines of Canada, by Provinces, 1940 and 1941

Province	1940				1941			
	Capital employed as represented by:				Capital employed as represented by:			
	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total	Cost of lands, buildings, machinery and tools	Cost of supplies and stocks on hand	Cash, trading and operating accounts and bills receivable	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	31,933,400	2,746,740	8,035,399	42,715,539	33,003,311	2,973,555	7,170,721	43,147,587
New Brunswick....	932,347	36,360	494,612	1,463,319	894,214	57,566	526,292	1,478,072
Manitoba.....	2,500	100	500	3,100	2,500	100	500	3,100
Saskatchewan.....	2,982,291	84,716	331,592	3,398,599	2,982,495	98,898	447,786	3,529,179
Alberta.....	27,257,731	863,425	6,265,591	34,386,747	29,092,375	966,049	6,705,091	36,763,515
British Columbia..	19,549,183	379,169	1,739,234	21,667,586	19,311,940	367,967	1,896,996	21,576,903
Canada.....	82,657,452	4,110,510	16,866,928	103,634,890	85,286,835	4,464,135	16,747,386	106,498,356

Table 158.—Employees, Salaries and Wages in the Coal Mines of Canada, by Provinces, 1941

Province	Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners		Total	Salaries	Wages
	Male	Female	Surface	Under-ground			
						\$	\$
Nova Scotia.....	478	61	2,150	10,779	13,468	1,061,501	18,765,480
New Brunswick....	41	9	380	942	1,372	97,642	1,251,207
Manitoba.....	45	6	1	3	4	1,230	1,230
Saskatchewan.....	45	6	254	359	664	101,777	664,447
Alberta.....	491	32	1,934	5,611	8,068	1,120,916	11,127,050
British Columbia..	173	14	653	1,914	2,754	462,217	3,496,135
Canada.....	1,228	122	5,372	19,698	26,330	2,841,053	35,305,549

Table 159.—Wage-earners Employed and Days' Work Done, by Months, in the Coal Mines of Canada, 1941, with Comparative Totals for 1940

Month	Number of wage-earners			Days work done		
	Surface	Under-ground	Total	Surface	Under-ground	Total
January.....	5,485	21,534	27,019	135,175	479,939	615,114
February.....	5,432	21,101	26,533	117,235	405,385	522,620
March.....	5,204	20,554	25,758	122,158	437,437	559,595
April.....	4,849	18,499	23,348	105,354	360,207	465,561
May.....	4,920	17,393	22,313	113,989	380,046	494,035
June.....	4,918	17,178	22,096	116,081	365,009	481,090
July.....	5,055	17,197	22,252	121,290	376,633	497,923
August.....	5,373	18,507	23,880	132,957	421,825	554,782
September.....	5,569	19,435	25,004	137,926	439,083	577,009
October.....	5,858	20,979	26,837	150,579	494,240	644,819
November.....	5,916	21,442	27,358	144,573	478,315	622,888
December.....	5,884	21,472	27,356	144,739	473,440	618,179
Total for 1941.....				1,542,056	5,111,559	6,653,615
Total for 1940.....				1,455,986	4,874,398	6,330,384

Table 160.—Output of Coal in Canada, by Grades, 1918-1941

Calendar year	Anthracite		Bituminous		Sub-Bituminous*		Lignite		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$		\$		\$
1918.....	115,405		11,636,100				3,226,331		14,977,926	55,192,896
1919.....	85,579		10,892,046				2,941,471		13,919,096	55,622,670
1920.....	127,513		13,122,924				3,696,327		16,946,761	82,496,538
1921.....	96,964	330,699	11,680,477	58,848,444			3,280,052	13,272,513	15,057,493	72,451,656
1922.....	40,417	122,538	11,630,488	53,348,507			3,486,526	12,047,452	15,157,431	65,518,497
1923.....	107	322	12,941,877	58,478,670	466,492	1,399,424	3,582,095	12,180,570	16,990,571	72,058,986
1924.....			9,435,732	40,662,894	590,168	1,761,086	3,554,287	11,170,008	13,633,197	53,593,988
1925.....			8,939,607	36,793,501	570,654	1,731,267	3,624,707	10,737,183	13,134,968	49,261,951
1926.....			12,393,079	48,153,572	489,736	1,458,116	3,595,316	10,263,406	16,478,131	59,875,094
1927.....			13,006,996	49,385,818	596,155	1,784,973	3,823,710	10,696,672	17,426,861	61,867,463
1928.....			12,971,744	50,584,108	740,496	2,076,212	3,852,053	11,097,513	17,564,293	63,757,833
1929.....			12,859,822	49,995,261	668,702	1,908,954	3,968,033	11,160,955	17,496,557	63,065,170
1930.....			10,824,833	41,789,061	603,358	1,705,236	3,453,127	9,355,451	14,881,324	52,849,748
1931.....			8,861,360	33,165,730	471,343	1,211,197	2,910,508	6,830,755	12,243,211	41,267,632
1932.....			7,714,278	28,073,744	550,902	1,329,316	3,463,732	7,714,635	11,738,913	37,117,695
1933.....			7,979,285	27,757,150	554,118	1,274,017	3,369,943	6,892,795	11,905,344	35,923,962
1934.....			10,058,782	34,556,274	537,598	1,256,936	3,213,903	6,432,732	13,810,193	42,045,942
1935.....			9,748,841	33,150,781	566,425	1,410,926	3,572,740	7,401,403	13,888,006	41,963,110
1936.....			10,796,135	36,256,347	566,235	1,432,741	3,866,812	8,102,846	15,229,132	45,791,934
1937.....			11,634,370	39,661,259	506,260	1,314,196	3,695,315	7,776,593	15,835,554	48,752,048
1938.....			10,329,783	35,403,781	488,915	1,269,131	3,476,021	7,309,250	14,291,718	43,952,171
1939.....			11,769,296	40,119,905	512,101	1,323,401	3,411,301	7,233,684	15,692,698	49,676,990
1940.....			13,333,037	45,350,950	598,686	1,569,771	3,635,161	7,755,123	17,566,884	54,675,844
1941.....			13,603,307	47,391,274	585,453	1,593,549	4,037,161	9,074,807	18,225,921	58,059,630

*Not separately reported prior to 1923.

Table 161.—Output and Value of Coal in Canada, by Kinds and by Provinces, 1940 and 1941

(Short tons)

Province	1940			1941		
	Number of mines	Quantity	Value	Number of mines	Quantity	Value
			\$			\$
NOVA SCOTIA (Bituminous).....	42	7,848,921	28,766,195	38	7,387,762	28,446,204
NEW BRUNSWICK (Bituminous).....	33	547,064	1,961,863	34	523,344	2,021,394
MANITOBA (Lignite).....	1	1,697	4,037	1	1,246	3,411
SASKATCHEWAN (Lignite).....	*110	1,097,517	1,408,540	102	1,322,763	1,713,478
ALBERTA—						
Bituminous.....	17	3,069,206	8,465,642	14	3,671,357	10,431,004
Sub-bituminous.....	18	598,686	1,569,771	13	585,453	1,593,549
Lignite.....	226	2,535,947	6,342,546	191	2,713,152	7,357,918
Total.....	†261	6,203,839	16,377,959	218	6,969,962	19,382,471
BRITISH COLUMBIA (Bituminous).....	22	1,867,846	6,157,250	26	2,020,844	6,492,672
YUKON (Bituminous).....						
CANADA—						
Bituminous.....	114	13,333,037	45,350,950	112	13,603,307	47,391,274
Sub-bituminous.....	18	598,686	1,569,771	13	585,453	1,593,549
Lignite.....	337	3,635,161	7,755,123	294	4,037,161	9,074,807
Total.....	469	17,566,884	54,675,844	419	18,225,921	58,059,630

*Exclusive of 30 small mines in operation during part of 1940 and 25 small mines operating during part of 1941.

†Exclusive of 28 small mines operated under special permits in 1940 and 24 small mines in 1941.

THE COKE AND ARTIFICIAL GAS INDUSTRY, 1941

Production from coke plants and from illuminating and fuel gas plants in Canada during 1941 was valued at \$50,818,720. This output was 8.8 per cent above the \$46,673,660 of the previous year and set a new record for the industry. Output for the year under review included 3,145,715 tons of coke valued at \$24,888,023 at the works, 57,728,803 M cubic feet of gas of which 57,477,104 M cubic feet valued at \$21,557,128 were sold or used, and by-products valued at \$4,373,569.

Twenty-eight coke and gas works operated in 1941, including 10 by-products and bee-hive plants and 18 retort coal and water gas plants. Fourteen of these works were located in Ontario, 4 in British Columbia, 4 in Quebec, 2 in Manitoba, 2 in Nova Scotia, and 1 in each of New Brunswick and Alberta. In addition to these producers, 1 company in Quebec and 2 in Ontario purchased coke-oven gas and distributed it for domestic or commercial use and data covering their operations have been included to round out the figures for the industry.

Output of coke from gas retorts, by-products and bee-hive ovens totalled 3,145,715 tons in 1941 compared with 3,015,394 tons in 1940 and 2,410,095 tons in 1939. By-product and bee-hive ovens produced 2,847,624 tons of coke in 1941 and gas retorts made 298,091 tons. In addition, 70,840 tons of petroleum coke were recovered in petroleum refineries.

Data on the distribution of coke (except petroleum coke) by the producers show that 195,880 tons were sold direct in domestic consumers, 1,382,051 tons were used in metallurgical works operated by the producing companies, 231,464 tons were used by coke plants as fuel or to make water gas, 645,529 tons were sold direct to consumers for foundry and other uses (other than domestic), 730,908 tons were sold to dealers for resale, and 44,574 tons were sold for export. The total distribution was 3,230,406 tons, including about 75,000 tons withdrawn from producers' stocks during the year. Total stocks of coke in the hands of producers amounted to 215,481 tons at the end of 1941.

Imports of coke made from coal declined to 614,417 tons in 1941 from 719,338 tons in 1940, but exports increased to 40,167 tons from 37,523 tons. Imports of petroleum coke during this period rose to 235,852 tons from 185,334 tons and exports (including re-exports of imported coke) advanced to 67,738 tons from 40,433 tons.

Manufactured gas, sold and used, amounted to 57,477,104 M cubic feet in 1941, including 46,818,325 M cubic feet from by-product ovens and 10,658,779 M cubic feet from gas plants. Sales of gas by the producers totalled 16,931,434 M cubic feet, of which 9,896,061 M cubic feet were from by-product ovens and 7,035,373 M cubic feet were from gas works. Most of the remaining gas was used as fuel in the producing plants or in their associated metallurgical works. These figures do not include 45,208 M cubic feet of (Pintsch) oil gas for lighting railway cars, 9,971,268 M cubic feet of still gas recovered at petroleum refineries, nor iron blast furnace gas and some producer gas which was recovered and used by the producers but for which no records are available.

The number of customers served with manufactured illuminating and fuel gas in 1941 was 493,933, the number of active meters was 513,489, the length of distributing mains was 3,906 miles, and the average calorific value of the gas sold ranged from 450 to 570 B.T.U. per cubic foot.

Table 162.—Materials Used in Coke and Gas Plants, 1940 and 1941

Materials	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Bituminous coal carbonized in ovens or retorts—					
(a) Canadian.....	Ton	1,418,671	6,048,615	1,434,215	6,237,832
(b) Imported.....	Ton	2,699,579	13,295,700	2,884,107	15,805,353
Bituminous coal for making water gas—					
Imported.....	Ton	2,699	20,691	3,522	34,463
Coke for gas-making—					
(a) Purchased.....	Ton	7,334	71,921	7,447	75,197
(b) Companies' own make.....	Ton	77,984	532,257	84,331	630,176
Oil used for enriching water gas.....	Imp. gal.	4,229,239	282,041	5,204,117	329,986
Absorbing and wash oil.....	Imp. gal.	220,038	27,743	255,563	30,926
Caustic soda.....	Pound	1,500,655	31,184	1,592,879	33,462
Lime.....	Ton	2,608	27,339	2,613	27,935
Water.....			20,917		18,836
Iron oxide.....	Ton	5,417	42,491	8,574	36,480
Sulphuric acid, 66° Be.....	Pound	61,483,735	432,618	47,693,474	473,238
All other materials.....			203,812		173,994
Total cost.....			21,037,329		23,967,878

Table 163.—Production in Canada, Imports and Exports of Coke and Its By-Products, 1940 and 1941

	1940		1941	
	Quantity	Value	Quantity	Value
Coke		\$		\$
PRODUCTION—by provinces—				
Nova Scotia, New Brunswick and Quebec..... tons	1,040,999	7,582,337	1,029,028	8,038,506
Ontario..... tons	1,732,303	12,842,138	1,832,109	14,985,196
Manitoba, Alberta and British Columbia..... tons	242,092	1,513,386	284,578	1,864,321
Total..... tons	3,015,394	21,937,861	3,145,715	24,888,023
IMPORTS..... tons	719,338		614,417	
EXPORTS..... tons	35,523	231,918	401,671	284,778
AVAILABLE FOR CONSUMPTION..... tons	3,699,209		3,719,965	
Other Products				
PRODUCTION—				
Ammonium sulphate..... tons	35,493	952,014	35,393	1,036,095
Gas: Sales..... M cu. ft.	15,392,723	14,803,049	16,931,434	15,888,723
Used in own plants..... M cu. ft.	22,877,703	2,865,974	23,489,119	3,052,823
Used in associated metallurgical works..... M cu. ft.	13,185,237	1,629,944	1,335,389	1,636,603
Gas otherwise accounted for, but not sold..... M cu. ft.	2,128,931	101,301	2,335,672	122,761
Not accounted for..... M cu. ft.	1,520,578	1,250,201	1,368,490	856,218
Benzol..... imp. gal.	5,614,458	715,981	6,031,137	723,608
Toluol and xylol..... imp. gal.				
Other light oils..... imp. gal.	2,301,370	634,631	1,990,910	686,649
Tar..... imp. gal.	32,817,895	1,762,324	33,375,297	1,902,394
Ammonia liquor..... pound N.H. ₃		20,380		19,210
IMPORTS—				
Ammonium sulphate..... tons	355	13,506	57	4,951
Coal tar and pitch.....		164,132		
EXPORTS—				
Ammonium sulphate..... tons	72,485	2,172,049	59,480	2,147,613
Coal tar and pitch..... gal.	406,597	37,088	540,964	58,626

THE NATURAL GAS INDUSTRY

Output of natural gas in Canada in 1941 totalled 43,495,353 thousand cubic feet as compared with 41,232,125 thousand cubic feet in the previous year. This production includes only the natural gas consumed for industrial and domestic purposes and does not take into account the waste gas burned in the Turner Valley field.

Wells in New Brunswick produced 653,542 thousand cubic feet compared with 616,041 thousand cubic feet in 1940. Approximately 6,400 consumers in Moncton and Hillsborough were supplied with gas from wells in the Stony Creek field, near Moncton. There were 40 wells in operation in this province at the end of 1941.

Ontario's output dropped 9 per cent to 11,828,703 thousand cubic feet from the 1940 production of 13,053,403 thousand cubic feet. Developments in this province in 1941 were summarized by Mr. A. R. Crozier, Acting Commissioner of Gas for Ontario, as follows:

"The decrease in the volume of natural gas produced may be accounted for by the depletion of the gas fields and the failure of exploratory drilling to develop new sources of supply, rather than by any lack of demand for natural gas. In fact, the industrial demand increased steadily throughout the year, and only through the enforcement of restrictive measures was it possible to prevent general and widespread shortages. In controlling the demand for natural gas, every effort was made to extend to essential war industries adequate and uninterrupted supplies of gas. This was only made possible by strict control and, in many instances, reduction of domestic and commercial consumption. Regulations were enacted which prohibited the supplying of gas service to new homes. Many domestic and commercial consumers voluntarily discontinued the use of natural gas for heating purposes.

"As a result of the steadily increasing demand for natural gas by the many essential war industries and the lack of adequate reserves, steps were taken early in the year to provide for additional supplies of gas by the construction of artificial gas plants at strategic points in southwestern Ontario. The first of these plants came into operation late in the year and a second, early in 1942; a third was in the process of construction by the end of 1941. It is interesting to note that at the two artificial gas plants already in operation, for the first time in Canada, liquid propane, a by-product derived in the refining of petroleum, was mixed with air and introduced directly into natural and artificial gas lines to supplement the respective gases. This method of supplementing the available supply of natural and artificial gases, while costly, has proved to be entirely satisfactory. Thus extensive and widespread shortages of gas were averted and Ontario's production of essential materials of war maintained.

"Drilling operations for the year were of a disappointing nature and while new supplies were brought in, there were no major fields developed. Although the larger gas companies were quite active and carried out much exploratory development, the smaller companies, syndicates and operators were forced to greatly restrict operations owing to wartime difficulties of obtaining funds for exploration.

"With the exception of the Malahide and Declute gas fields, other fields showed a normal decline both in production capacity and rock pressures. The Malahide and Declute fields dropped off very sharply early in the spring when water encroached with the result that the available reserves of natural gas were considerably reduced. Several wells were completed in Lake Erie in front of the Tilbury field and while the open flow of these wells was not large, the rock pressure was higher than the average pressure of the operating wells in the field. However, owing to the cost of protecting producing wells in the lake against ice flows and wave action, some doubt exists as to whether it is economically sound to continue lake drilling."

There were 205 operating, distributing and drilling firms active in the natural gas industry in Ontario during 1941. These firms reported a total capital investment of \$51,528,641; employment was furnished by this industry to 1,529 salaried employees and wage-earners.

Saskatchewan produced 106,168 thousand cubic feet of natural gas in 1941 compared with 100,773 thousand cubic feet in the preceding year. The 1941 output was used principally to supply customers in Lloydminster.

Natural gas production in Alberta totalled 30,905,440 thousand cubic feet in 1941 compared with 27,459,808 thousand cubic feet in 1940. These figures include only the natural gas consumed for industrial and domestic purposes and do not take into account the waste gas burned in the Turner Valley field.

The Turner Valley field is the largest natural gas producing area in Canada; this field is located about 35 miles southwest of Calgary. Industrial and domestic users consumed 23,635,361 thousand cubic feet of Turner Valley gas in 1941; in the previous year, 2,448,402 thousand cubic feet were used. Approximately 25,500 consumers in Calgary, Lethbridge and the districts were served with this gas in 1941; in addition, a considerable quantity was used in the field for drilling purposes.

Approximately 2,700 customers in the city of Medicine Hat were supplied with gas from the Medicine Hat field. The total consumption of gas in this city was 2,596,785 thousand cubic feet as against 2,325,176 thousand cubic feet in 1940. The Redcliffe field, located about 2 miles west of Medicine Hat, supplied industrial and domestic users with 522,734 thousand cubic feet of gas in 1941 compared with 636,408 thousand cubic feet in the previous year.

Edmonton obtains its supply of gas from the Viking field, which is situated about 80 miles southwest of the city. In 1941 gas was supplied by this field to 13,200 customers in Edmonton and to over 600 users outside the city. Twenty-one wells were in operation in the Viking field in 1941.

In Alberta, on December 31, 1941, there were 104 wells producing natural gas only, compared with 95 wells in 1940. Capital employed by this industry in Alberta in 1941 was \$28,166,141 compared with \$26,967,881 in 1940. The industry employed 511 people who received salaries and wages totalling \$757,328.

It was estimated that at Fort Norman in the Northwest Territories some 1,500 thousand cubic feet of natural gas were used for power purposes.

Table 164.—Production of Natural Gas in Canada, by Provinces, 1931-1941

Year	New Brunswick		Ontario		Manitoba		Alberta		Canada	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		\$		\$		\$		\$		\$
1931.....	655,891	323,184	7,419,534	4,635,497	600	180	17,798,698	4,067,893	25,874,723	9,026,754
1932.....	662,452	326,191	7,386,154	4,719,297	600	180	15,370,968	3,853,794	23,420,174	8,599,463
1933.....	618,003	302,706	7,166,659	4,523,085	600	180	15,352,811	3,886,263	23,138,103	8,712,234
1934.....	623,601	306,005	7,682,851	4,741,368	600	180	14,841,491	3,707,276	(a)23,162,324	(a)8,759,652
1935.....	615,454	303,886	8,158,825	4,938,084	600	180	16,060,349	4,113,436	(b)24,910,786	(b)9,363,141
1936.....	606,246	298,819	10,006,743	6,052,294	600	180	17,407,820	4,376,720	(c)28,113,348	(c)10,762,243
1937.....	576,671	283,922	10,746,334	6,588,798	600	180	20,955,506	4,766,437	(d)32,380,991	(d)11,674,802
1938.....	577,492	284,689	10,952,806	6,460,764	600	180	21,822,108	4,807,346	(e)33,444,791	(e)11,587,450
1939.....	606,382	292,403	11,966,581	7,261,928	600	180	22,513,660	4,915,821	(f)35,185,146	(f)12,507,307
1940.....	616,041	300,543	13,053,403	7,745,834	600	180	27,459,808	4,923,469	(g)41,232,125	(g)13,000,59
1941.....	653,542	317,437	11,828,703	7,140,130	.....	.....	30,905,440	5,175,364	(h)43,495,353	(h)12,665,113

(a) Includes production in Saskatchewan of 13,781 M cu. ft. at \$4,823.

(b) Includes production in Saskatchewan at 75,558 M cu. ft. at \$7,555.

(c) Includes production in Saskatchewan of 90,839 M cu. ft. at \$33,985 and in the Northwest Territories of 1,100 M cu. ft. at \$245.

(d) Includes production in Saskatchewan of 100,380 M cu. ft. at \$35,130 and in the Northwest Territories of 1,500 M cu. ft. at \$335.

(e) Includes production in Saskatchewan of 90,285 M cu. ft. at \$34,136 and in the Northwest Territories of 1,500 M cu. ft. at \$335.

(f) Includes 96,423 M cu. ft. at \$36,640 in Saskatchewan and 1,500 M cu. ft. at \$335 for Northwest Territories.

(g) Includes 100,773 M cu. ft. at \$30,232 in Saskatchewan and 1,500 M cu. ft. at \$335 in Northwest Territories.

(h) Includes 106,168 M cu. ft. valued at \$31,850 in Saskatchewan and 1,500 M cu. ft. valued at \$335 in the Northwest Territories.

Table 165.—Production of Natural Gas in Canada, by Months, 1941

	New Brunswick	Ontario	Saskatchewan	Alberta	Canada
	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.	M cu. ft.
January.....	74,894	1,509,538	15,555	3,676,525	5,276,512
February.....	75,410	1,527,606	15,969	3,251,619	4,870,604
March.....	67,366	1,502,902	12,810	3,126,234	4,709,312
April.....	68,388	1,043,122	8,054	2,255,692	3,375,256
May.....	54,786	750,636	5,146	2,133,067	2,943,635
June.....	48,085	580,811	3,589	1,655,319	2,287,804
July.....	31,263	472,338	2,272	1,645,758	(a)2,152,131
August.....	28,510	489,661	2,765	1,665,552	(a)2,186,988
September.....	34,882	586,490	6,233	2,062,352	(a)2,690,437
October.....	46,953	782,291	7,166	2,473,227	3,309,637
November.....	60,318	1,205,817	11,801	3,104,149	4,382,085
December.....	62,707	1,377,491	14,808	3,855,946	5,310,953
Total.....	653,542	11,828,703	106,168	30,905,440	43,495,353

(a) Includes production from Fort Norman, Northwest Territories.

Table 166.—Natural Gas Production in Ontario, by Fields, 1940 and 1941

County	Field	1940	1941
		M cu. ft.	M cu. ft.
Essex.....	Kingsville.....	2,902,079	32,418
	Tilbury.....		2,433,968
Kent.....	Declute.....	2,717,192	1,482,186
	Dover.....	381,837	341,516
	Chatham.....	.....	165,010
	Dawn.....	2,276,346	1,661,500
Lambton.....	Oil Springs.....	21,444	8,249
	Mosa.....		.....
Middlesex.....	Brownsville (x).....	1,036,260	220,077
Oxford.....	Bayham.....		81,356
Elgin.....	Bayham.....	608,860	2,497,447
Elgin.....	Malahide.....	432,510	421,717
Norfolk.....	Norfolk.....	2,101,759	1,962,524
Lincoln.....	Lincoln.....		.....
Haldimand.....	Haldimand.....	267,567	274,039
Wentworth.....	Wentworth.....		151,193
Welland.....	Welland.....	151,193	182,360
Brant.....	Onondaga.....	1,000	.....
Prince Edward.....	Hallowell.....	14,000	14,000
Wells in surface drift.....	Harwich and Howard Tps.....	60,000	60,000
Private wells.....	.....	.....	.....
Total produced.....		13,053,403	11,828,703

(x) Dereham Twp..... 809,745 M cu. ft.; Bayham Twp..... 226,515 M cu. ft.—1940
Dereham Twp..... 178,841 M cu. ft.; Bayham Twp..... 41,236 M cu. ft.—1941

Table 167.—Number of Gas Wells in Canada, by Provinces, 1938-1941

	New Brunswick	Ontario	Manitoba	Saskatchewan	Alberta	Canada
Productive wells at beginning of year....1939	36	3,122	4	3	96	3,261
1940	39	3,163		4	95	3,301
1941	42	3,240		3	95	3,380
Number of productive wells drilled.....1939	3	142				145
1940	4	151				155
1941	3	173				176
Number of dry wells drilled.....1939	2	63				65
1940	1	86		1		88
1941		143				143
Number of wells abandoned.....1939		84		1		84
1940	1	91				93
1941	5	127		1		132
Productive wells at end of year.....1939	39	3,163	4	3	96	3,305
1940	42	3,240		3	95	3,380
1941	40	3,277		3	104	3,424

Table 168.—Natural Gas Wells in Ontario, by Townships, 1940 and 1941

Township	1940				1941			
	No. of producing wells in operation Dec. 31, 1939	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1940	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Ancaster.....							2	
Bayham.....	65	1	6	1	65	7		
Bertie.....	132	5	1	14	138	8	1	11
Binbrook.....	50	1			49			
Brantford.....				2	2			
Caistor.....	62	3	1	6	65	1	2	2
Camden Gore.....							3	1
Canboro.....	155	4		3	153	14	1	5
Cayuga N.....	193	5	1	2	195	7	3	8
Cayuga S.....	56	1			54		1	
Charlotteville.....	13				13		1	
Chatham.....	4		7	3	9	1	12	9
Colchester.....			5				1	
Crowland.....	27			1	28			
Culross.....							2	
Dawn.....	24				24	1	1	
Dereham.....	62	8	8	2	52	34	1	
Dorchester N.....			2				2	
Dorchester S.....			1					
Dover West.....								
Dover East.....	19	1		1	21		1	
Dunn.....	50	1			50			
Dunwich.....							2	
Enniskillen.....	2	2					1	
Gainsboro.....	14	1			13			
Glanford.....	10				10			1
Gosfield S.....	26	2		1	21			1
Hallowell.....	6			2	13			
Houghton.....	4				4			
Humberstone.....	57		2	12	68	2	4	13
Kincardine.....							1	
Malahide.....	1	1	6	28	46		5	17
Malden.....			4	2	1	1	7	
McGillivray.....			1					
Mersea.....	4	1			3			
Middleton.....	42	1	1	3	51	3	7	1
Mosa.....			1		3			
Moulton.....	116	4			110	9		1
Norwich N.....			2					
Norwich S.....			1				3	
Nottawasaga.....				1				
Oneida.....	64	2	4	8	69	3	8	15
Onondaga.....	37	2		1	37	6		
Orford.....			1				3	
Oxford N.....							1	
Oxford W.....			1				6	
Plympton.....			1					
Rainham.....	323	6	3	8	326	5	3	3
Raleigh.....	56	1	4	6	56	2	1	2
Romney.....	133			1	130			4
Sarnia.....	5							

Table 168.—Natural Gas Wells in Ontario, by Townships, 1940 and 1941—Concluded

Township	1940				1941			
	No. of producing wells in operation Dec. 31, 1939	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year	No. of producing wells in operation Dec. 31, 1940	No. of wells abandoned this year	No. of dry wells drilled this year	No. of producing wells drilled this year
Seneca.....	151	5	7	4	152	3	1	9
Sherbrooke.....	15				15			
Southwold.....			1					
Tilbury East.....	132	4			126		1	2
Townsend.....	2			1	3			1
Tuscarora.....	75	13	1	10	72	3	4	7
Wainfleet.....	27	1			28	4	2	2
Walpole.....	425	12	9	15	432	10	27	41
Walsingham N.....	8	1			8		1	
Walsingham S.....	19				19			
Willoughby.....	50	2	3	5	53	1	3	1
Windham.....	9			2	10		12	11
Woodhouse.....	69			6	73	1	4	5
Yarmouth.....			1				2	
Private Wells.....	300				300			
Surface Wells.....	69				69			
Total.....	3,163	91	86	151	3,240	127	143	173

Table 169.—Capital Employed in the Natural Gas Industry in Canada, by Provinces, 1940 and 1941

	1940			1941		
	Ontario	Alberta	Canada*	Ontario	Alberta	Canada*
	\$	\$	\$	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—						
Cost of lands, buildings, plant, machinery and tools.....	43,032,620	24,367,282	69,212,643	43,727,294	25,433,809	70,587,671
Cost of supplies and stock on hand.....	625,281	215,341	863,730	875,341	282,838	1,181,581
Cash, trading and operating accounts and bills receivable.....	7,865,881	2,385,258	10,411,393	6,926,006	2,449,494	9,511,289
Total.....	51,523,782	26,967,881	80,487,766	51,528,641	28,166,141	81,280,541

*Includes data for New Brunswick and Saskatchewan.

Table 170.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, by Provinces, 1940 and 1941

Province	*Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1940					\$	\$	\$
New Brunswick.....	12	9	74	95	35,899	82,625	118,524
Ontario.....	498	146	898	1,542	953,116	878,374	1,831,490
Saskatchewan.....	2		10	12	1,974	6,934	8,908
Alberta.....	99	45	396	540	227,847	561,971	789,818
Canada.....	611	200	1,378	2,189	1,218,836	1,529,904	2,748,740
1941							
New Brunswick.....	13	8	91	112	39,603	109,374	148,977
Ontario.....	591	152	786	1,529	1,065,265	864,760	1,930,025
Saskatchewan.....	1	1	7	9	3,000	2,465	5,465
Alberta.....	247	46	218	511	551,691	205,637	757,328
Canada.....	852	207	1,102	2,161	1,659,559	1,182,236	2,841,795

* See footnote on page 32, table 26.

THE PETROLEUM INDUSTRY IN CANADA

Including (1) Production of Crude Petroleum; and (2) Petroleum Products

(1) Production of Crude Petroleum

The Canadian production of crude petroleum and natural gasoline totalled 10,133,838 barrels worth \$14,415,096 as compared with 8,590,978 barrels valued at \$11,160,213 in 1940.

Production from New Brunswick wells in 1941 amounted to 31,359 barrels compared with 22,167 barrels in the preceding year. As in former years, production was obtained from the Stony Creek field near Moncton.

Ontario's production decreased to 160,238 barrels worth \$337,760 from 187,644 barrels worth \$397,078 in 1940. Mr. A. R. Crozier, Acting Natural Gas Commissioner, summarizes, for 1941, the petroleum situation in the province as follows:

"Although the demand for petroleum increased steadily during the year, and the average price paid per barrel at the refineries improved, the quantity of petroleum produced declined 15.2 per cent from the preceding year. It may be said that the failure of the oil producers to maintain or increase the output of petroleum was due to the steady decline of the oil wells of the Dawn and Warwick fields, and the disappointing results obtained in exploratory drilling, rather than a falling off of the productive capacity of the older oil fields.

"Drilling activities for the second consecutive year decreased; 74 wells were completed, of which 35 were producers and 39 dry. The total number of oil wells, including operating and non-operating wells was 3,500, 13 more than in 1940.

"Ontario crude demanded an average price of \$2.12 per barrel, the highest price paid by refineries since 1926, with the exception of 1937. Increased operating expenses and the low yield of oil per well, however, more than counterbalanced the increase in the price per barrel, and the petroleum producer, therefore, received little benefit.

Production of crude oil and natural gasoline in Alberta totalled 9,918,577 barrels in 1941 against 8,362,203 barrels in the preceding year. Four natural gasoline absorption plants were active in Alberta during 1941. The Royalite Oil Co. Limited operated two of these plants; the other two were operated by the Gas and Oil Products Limited and the British American Oil Company.

The following is an excerpt from a review of the Development of Alberta's Natural Resources in 1941 by Mr. J. L. Irwin, Statistician, Department of Lands and Mines of that province:

"In a line running north-west of Major 4, the last producer to be completed in the north end, wells are now being drilled over a stretch of 12 miles to reach as far north as the Sarcee Indian Reserve, inside of which 2 wells, Inland Sarcee 1 and 2, are being drilled some 15 miles from the south-west of the city of Calgary. Developments in this new and lengthy area will indeed be interesting to watch.

The Vermilion Oil Field

"Additional interest has now been created in the Vermilion oil field about 110 miles east of Edmonton as a result of oil-fuel demands made by the railways.

"The Vermilion-Wainwright-Dina-Lloydminster area offers a good prospect for increasing materially Alberta's oil production total in 1942.

"Production of individual wells is moderate but appreciable. The oil is found in the Lower Cretaceous formation at depths from 1,600 to 1,900 feet. As a result of easy drilling to so shallow a horizon wells can be drilled at a cost of from \$12,000 to \$15,000.

"The product from the extensive Vermilion area is heavy with a gravity from 14° to 22°, A.P.I. In the past the production from wells in this new field has been pumped but the latest wells to be brought in have been flowing.

"With a plant to condition the oil and with an established market, two factors so much needed in the past but both at last accessible, widespread development of the field, if the present shortage of casing can be overcome, may now materialize.

Other Alberta Fields

"Oil production for 1941 in fields outside of Turner Valley was as follows:

Field	Number of wells	Barrels
Del Bonita.....	2	4,393
Dina.....	2	2,894
Lloydminster.....	1	416
Princess.....	2	19,587
Red Coulee.....	7	11,626
Taber.....	1	5,600
Vermilion.....	7	21,851
Wainwright.....	6	11,933
Totals.....	28	78,300

"This total, though insignificant in comparison with that of Turner Valley, is, nevertheless, an important one.

"It is important because it shows increase and promise of increase. It is important also because it demonstrates the wide-spread area of Alberta's oil. What the future holds for production from these areas, and others yet to appear, is of course unknown. It is not unreasonable, from the encouraging reports received from geological surveys, to expect that it will be a satisfactory one. New major fields are needed. Their production, added to that of Turner Valley, will put Alberta in the forefront amongst the oil producing countries of the world.

"Crude oil from Turner Valley's limestone made its first appearance, from the viewpoint of noticeable volume, on June 16, 1936, when the Turner Valley Royalties well was brought into production. Since that date crude oil producing wells from this formation in the Valley have appeared as follows:

Year	Number of producing wells
1936.....	2
1937.....	22
1938.....	36
1939.....	34
1940.....	36
1941.....	46
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Turner Valley Development

"Turner Valley's development and successful production of oil increased steadily through the year.

"At the close of 1941, out of the 176 oil producing wells of the Valley, the 6 largest were in the prolific north end. In order of importance they were Major 3, Major 2, Miracle 1, Ace Royalties 1, Home 7 and Home 2. With the exception of Home 2 all were brought into production in the latter part of the year.

"This particular section of the field is still an unknown quantity. Major 2 had no sooner made its dramatic appearance early in October when it was eclipsed, some two weeks later, by the very much greater performance of Major 3, three-quarters of a mile to the north-west, the present largest well in the Valley.

"Now comes the announcement, in the middle of January, of Major 4's completion, half a mile to the north of Major 3, which promises to be still another big well.

"An additional feature of encouraging interest was the arrival, at the end of September, of Northwest Hudson's Bay 6, the most southerly well in the Valley, which by the close of the year was the Valley's ninth largest producer. It has been some time since the south end of the field has been heard from and the news was generally welcomed.

"With the coming of these new and spectacular events the Turner Valley field, curving slightly to the north-west from its southern extremity, is now extended from 17½ miles to approximately 20 in length.

Table 171.—Footage Drilled

	1940	1941
Turner Valley.....	296,832 feet	376,676 feet
Other fields.....	23,448 "	51,824 "
Gas development.....	1,045 "	16,123 "
Exploration.....	48,779 "	46,716 "
Totals.....	370,104 "	491,339 "

Increase for 1941—121,235 feet.

Production in the Northwest Territories near Fort Norman increased to 23,664 barrels as compared with 18,633 barrels in 1940. Three wells were operated and the resultant products, gasoline and fuel oil, were used to a considerable extent by mining and transportation companies in this area.

Table 172.—Production of Crude Petroleum in Canada, by Provinces, 1931-1941

Year	New Brunswick		Ontario		Alberta		Northwest Territories		Canada	
	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$	Barrels	Value \$
1931.....	6,577	15,461	122,365	219,993	1,413,631	3,976,220	.....	.....	1,542,573	4,211,674
1932.....	6,408	14,332	130,343	247,468	908,751	2,751,541	.....	.....	1,044,412	3,022,592
1933.....	8,835	18,111	136,058	253,486	995,832	2,844,157	4,608	9,251	1,145,333	3,138,791
1934.....	11,106	22,277	141,385	299,874	1,253,966	3,104,823	4,438	22,188	1,410,895	3,449,162
1935.....	12,954	18,230	165,041	346,156	1,263,510	3,102,227	5,115	25,575	1,446,620	3,492,188
1936.....	17,112	24,075	165,495	350,767	1,312,368	3,019,930	5,399	26,995	1,500,374	3,421,767
1937.....	18,089	25,496	165,205	356,000	2,749,085	4,961,002	11,371	56,855	2,943,750	5,399,353
1938.....	19,276	27,246	172,641	359,268	6,751,312	8,775,094	22,855	68,555	6,986,084	9,230,173
1939.....	22,799	32,082	206,379	401,430	7,576,932	9,362,363	20,191	50,477	7,826,301	9,846,352
1940.....	22,167	31,220	187,644	397,078	8,362,203	10,694,394	18,633	37,265	8,599,978	11,160,213
1941.....	31,359	44,102	160,238	337,760	9,918,577	13,985,906	23,664	47,328	10,133,838	14,415,096

*Includes 331 barrels at \$256 in Saskatchewan.

Table 173.—Production of Crude Petroleum in Canada, by Months, 1941

(Barrel=35 imperial gallons)

Month	*New Brunswick	Ontario	*Alberta	*Northwest Territories	Canada
	Barrels	Barrels	Barrels	Barrels	Barrels
January.....	2,663	13,396	787,409	.....	803,463
February.....	2,322	13,136	732,606	.....	738,064
March.....	2,825	12,793	834,953	.....	850,571
April.....	2,690	13,494	806,817	.....	823,001
May.....	2,998	14,012	826,982	.....	843,992
June.....	2,721	12,646	801,458	2,008	818,833
July.....	2,688	15,158	849,834	10,028	877,733
August.....	2,659	13,008	851,871	4,230	871,768
September.....	2,489	13,489	856,301	7,398	879,677
October.....	2,532	13,609	856,237	.....	872,378
November.....	2,316	11,791	812,757	.....	856,864
December.....	2,456	13,706	881,322	.....	897,484
Total.....	31,359	160,238	9,918,577	23,664	10,133,838

*These figures include total output each month.

Table 174.—Petroleum Wells in Canada, by Provinces, 1939-1941

		New Brunswick	Ontario	Alberta	Northwest Territories	Canada
Productive wells at beginning of year.....	1939	23	2,110	195	2	2,330
	1940	22	2,065	219	2	2,308
	1941	20	2,028	235	3	2,286
Number of productive wells drilled.....	1939		63	36		99
	1940		42	35	1	78
	1941		35	48		83
Number of wells abandoned.....	1939		36	7		43
	1940	2	61	2		65
	1941		31	9		40
Number of dry wells drilled.....	1939	1	85	13		99
	1940		36	7		43
	1941		39	10		49
Number of productive wells in operation at end of year.....	1939	23	2,065	219	2	2,309
	1940	20	2,028	235	3	2,286
	1941	20	1,956	274	3	2,253

Table 175.—Production of Crude Petroleum in Canada, 1940 and 1941

	1940		1941	
	Barrels	Total value	Barrels	Total value
		\$		\$
NEW BRUNSWICK.....	22,167	31,220	31,359	44,102
ONTARIO—				
Petrolia and Enniskillen.....	55,589	116,658	55,383	115,473
Oil Springs.....	31,392	69,016	29,783	65,761
Moore Township.....	1,307	2,743	1,333	2,779
Sarnia Township.....	370	776	213	444
Plympton Township.....	89	187	63	194
Bothwell Township and Thamesville.....	36,684	76,982	33,053	68,916
West Dover.....	11,856	24,880	9,574	19,862
Onondaga.....	957	2,169	300	625
Mosa Township.....	17,288	36,279	19,075	39,771
Brooke.....	51	107	113	236
Dunwich.....	337	707	420	876
Raleigh and Tilbury East.....	76	160	245	511
Dawn and Euphemia.....	2,294	4,814	834	1,739
Warwick.....	29,354	61,600	9,748	20,325
Chatham.....			27	56
Manitoulin Island.....			44	92
Total for Ontario.....	187,644	397,078	160,238	337,760
SASKATCHEWAN.....	331	256		
ALBERTA—				
Turner Valley.....	8,326,141	10,668,155	9,870,550	13,947,320
Red Coulee (light crude).....	12,080	10,872	11,065	10,902
Wainwright-Ribstone (heavy crude).....	23,982	15,367	36,962	27,684
Taber-Moose Dome.....				
Total for Alberta.....	8,362,203	10,694,394	9,918,577	13,985,906
NORTHWEST TERRITORIES.....	18,633	37,265	23,664	47,328
Canada.....	8,590,978	11,160,213	10,133,833	14,415,096

Table 176.—Capital Employed in the Petroleum Industry in Canada, by Provinces, 1940 and 1941

	1940			1941		
	Ontario	Alberta	Canada*	Ontario	Alberta	Canada*
	\$	\$	\$	\$	\$	\$
Capital employed as represented by:						
Cost of lands, buildings, plant, machinery and tools.....	1,185,889	40,956,466	42,289,564	957,757	45,439,003	46,676,002
Cost of supplies and stock on hand.....	20,936	1,021,178	1,980,875	19,424	2,200,221	2,277,566
Cash, trading and operating accounts and bills receivable.....	69,691	9,627,262	9,846,414	36,828	9,079,038	9,253,416
Total.....	1,276,516	51,604,906	53,216,853	1,014,009	56,718,262	58,206,984

Data for New Brunswick included with the Natural Gas Industry.

* Includes data for the Northwest Territories.

Table 177.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces,* 1940 and 1941

Province	Average number of employees				Salaries and wages		
	Salaried employees		Wage-earners	Total	Salaries	Wages	Total
	Male	Female					
1940					\$	\$	\$
Ontario.....	18	3	247	268	22,683	147,234	170,217
Alberta.....	279	46	1,138	1,463	724,583	1,916,809	2,641,395
Canada†	299	49	1,393	1,741	754,229	2,081,181	2,835,410
1941							
Ontario.....	20	2	157	179	21,587	107,916	129,503
Alberta.....	335	58	1,264	1,657	842,047	2,264,417	3,106,464
Canada†	356	60	1,428	1,844	867,638	2,387,179	3,254,817

* Data for New Brunswick is included in the Natural Gas Industry.

† Data for Northwest Territories included with Canada.

PETROLEUM PRODUCTS INDUSTRY, 1941

Statistics for the Petroleum Products Industry cover all establishments in Canada which were occupied chiefly in (a) the refining of crude oil to produce gasoline, fuel oil, etc., and (b) the blending or compounding of lubricating oils and greases.

Thirty-five refineries and 14 blending plants, or a total of 49 works, reported under this category in 1941 and the aggregate value of production was \$156,635,495, an increase of 28·2 per cent over the 1940 total of \$122,212,800.

Output figures for 1941 included \$155,389,872 for petroleum refineries and \$1,245,623 for concerns engaged in blending oils and greases, against corresponding totals in 1940 of \$121,012,497 and \$1,200,303, respectively.

Thirty-five petroleum refineries operating in Canada during 1941 were distributed by provinces as follows: 9 in Saskatchewan, 7 in Alberta, 5 in Ontario, 4 in Quebec, 4 in Manitoba, 3 in British Columbia and 1 in each of Nova Scotia, New Brunswick and Northwest Territories. Compared with 1940, there was a loss of 2 refineries in Alberta and 1 in Saskatchewan. The operating refineries had a capacity of 232,290 barrels of crude oil per day, of which Ontario had 68,000 barrels or 29·3 per cent; Quebec, 67,000 barrels or 2·8 per cent; Nova Scotia, 34,000 barrels or 14·6 per cent; British Columbia, 24,500 barrels or 10·6 per cent; Saskatchewan, 17,300 barrels or 7·4 per cent; Alberta, 16,250 barrels or 7·0 per cent; Manitoba, 4,150 barrels or 1·8 per cent; the Northwest Territories, 840 barrels or ·4 per cent, and New Brunswick, 250 barrels.

During the year, 1,681,058,493 gallons of imported crude oil and 352,839,574 gallons of crude oil and absorption gasoline from Canadian wells, or a total of 2,033,898,067 gallons was put through Canadian refineries, this amounting to about 67 per cent of the rated capacity. Of the total crude input, about 47 per cent was imported from the United States and nearly 35 per cent from other countries, while about 17 per cent came from Canadian wells. The total cost at the refineries of all crude oil and naphtha charged to stills during the year was \$113,574,954. Stocks of crude oil held at the refineries on December 31 amounted to 144,786,917 gallons.

Refinery production of gasoline in 1941 amounted to 957,924,454 gallons, and in addition the refineries used for blending about 47,301,143 gallons of imported casinghead gasoline which is not included in the Canadian production figures. The gallonage of gasoline made in 1941 was the highest on record, being 10 per cent over 1940, which in turn was 5 per cent over 1939. The refinery selling value of the gasoline made during the year was \$90,130,773. Stocks of gasoline held by the reporting firms on December 31 included 117,170,696 gallons of straight run or cracked gasoline and 4,249,650 gallons of imported casinghead gasoline. In 1941 there was an output of 10,262,175 gallons of natural gasoline from absorption plants in Alberta. This was practically all sold to refineries and is included with the gallonage charged to stills and the refined gasoline made therefrom is included in the refinery output figures.

Imports of gasoline, including casinghead, amounted to 88,522,531 gallons during 1941, which, added to the production of 857,924,454 gallons plus the decline in stocks of 7,712,347 gallons and less the exports of 15,843,229 gallons, made an apparent Canadian consumption of 938,316,103 gallons. Actual sales reported to the Provincial Governments under the Gasoline Tax Acts amounted to 980,426,039 gallons.

Production of fuel and gas oils (excluding any made and used for cracking processes) totalled 834,848,910 gallons, of which 771,897,171 gallons were made for sale and 62,951,739 gallons for use as fuel in the producing plant. Imports amounted to 63,385,706 gallons and exports to 18,469,619 gallons. Refinery stocks at the end of the year stood at 93,703,708 gallons, or about 993,000 gallons more than in 1940. The apparent consumption of fuel and gas oils in Canada, as calculated from the above figures, amounted to 868,595,460 gallons.

Output of tractor and engine distillates was 40,810,126 gallons in 1941, imports amounted to 965,827 gallons, and producers' stocks increased 1,239,674 gallons. The apparent Canadian consumption was 40,536,279 gallons.

Table 178.—Materials Used in Petroleum Products Industry, 1940 and 1941

Material	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Crude oil (under 60° A.P.I.) in its natural state, from Canadian wells	Imp. gal.	293,601,299	13,651,059	342,774,192	17,627,799
Absorption gasoline, etc., from Canadian wells (run to stills)	Imp. gal.	8,634,531	531,410	10,065,382	643,968
Crude oil, in its natural state, imported, (run to stills)—					
(a) From United States	Imp. gal.	996,917,614	50,083,035	948,975,940	55,377,605
(b) From Other Countries	Imp. gal.	445,437,156	21,434,013	731,145,673	39,877,817
Crude oil, not in its natural state (run to stills)	Imp. gal.	903,681	41,108	936,880	47,765
Benzol for blending	Imp. gal.	1,762,372	284,410	4,753,868	568,575
Phenol	pound	203,150	31,270	470,309	69,308
Sulphuric acid, 66° Bé	pound	27,995,157	301,445	29,316,857	315,083
Sulphur	pound	122,131	3,110	102,634	2,649
Caustic soda	pound	6,122,558	177,477	7,170,755	205,336
Soda ash	pound	664,826	13,662	410,738	8,920
Litharge	pound	323,510	26,121	257,296	22,430
Fullers' earth and clay	pound	23,828,660	406,185	30,155,750	571,010
Compounding materials			945,628		1,386,825
Tetraethyl fluid			4,309,173		3,944,940
Aviation blending materials					1,458,307
Other materials			1,017,069		2,013,991
Shipping containers			1,046,713		1,115,986
Total			94,302,889		125,258,314
Lubricating oils and greases			557,632		723,923
Grand Total			94,860,521		125,982,237

Table 179.—Products of the Petroleum Products Industry, 1940 and 1941

Product	Unit of measure	1940		1941	
		Quantity	Gross selling value at works	Quantity	Gross selling value at works
			\$		\$
MADE FOR SALE—					
Gasoline—Straight run (1)	Imp. gal.	409,289,135	37,868,711	407,405,924	44,722,348
—By cracking process (2)	Imp. gal.	370,455,070	33,333,704	450,312,427	45,535,487
Stove oil (40°-42.5° A.P.I.)	Imp. gal.	19,933,578	889,879	23,231,604	1,307,618
Gas and light fuel oil (20°-40° A.P.I., except diesel)	Imp. gal.	114,798,038	5,753,019	135,322,203	7,512,039
Diesel fuel oil (all fuel oil sold under this name)	Imp. gal.	62,968,650	3,261,731	79,104,809	4,192,138
Residual fuel oil (10°-20° A.P.I.)	Imp. gal.	439,928,344	17,050,341	534,238,465	23,197,496
Tractor and engine distillate	Imp. gal.	23,795,943	2,138,333	40,807,811	3,748,290
V.M. and P. or solvent naphtha	Imp. gal.	12,686,637	1,197,633	12,092,093	1,230,697
Kerosene	Imp. gal.	25,946,906	2,387,294	26,758,097	2,741,984
Lubricating oil	Imp. gal.	28,380,256	5,530,531	36,433,253	7,089,121
Lubricating grease	pound	9,441,500	549,456	15,562,856	861,604
Asphalt	Imp. gal.	60,312,753	5,226,995	72,752,742	6,168,440
Petroleum coke	ton	63,453	416,262	67,702	471,564
Other products			554,763		479,572
Total—Made for sale			116,128,737		149,258,998

Table 179.—Products of the Petroleum Products Industry, 1940 and 1941—Concluded

Product	Unit of measure	1940		1941	
		Quantity	Gross selling value at works	Quantity	Gross selling value at works
			\$		\$
MADE FOR HOME USE—					
Gasoline—Straight run.....	Imp. gal.	223,028	22,537	192,848	21,650
—By cracking process.....	Imp. gal.	15,873	1,902	13,255	1,684
Gas and light fuel oil (20°–40° A.P.I.).....	Imp. gal.	113,769	4,868	100,396	4,545
Diesel fuel oil.....	Imp. gal.	5,427	530	18,831	1,230
Residual fuel oil (10°–20° A.P.I.).....	Imp. gal.	61,165,490	2,431,454	62,832,512	2,727,422
Tractor and engine distillate.....	Imp. gal.	1,820	197	2,315	170
Kerosene.....	Imp. gal.	26,550	2,326	41,741	3,775
Lubricating oil.....	Imp. gal.	83,582	15,324	93,918	17,453
Asphalt.....	Imp. gal.	68,260	5,411	62,003	5,485
Petroleum coke.....	ton	4,876	25,328	3,138	21,774
Still gas.....	M cu. ft.	8,706,834	2,164,514	9,971,268	3,109,920
Other products.....			209,369		215,766
Total—Made for own use.....			4,883,760		6,130,874
Fuel and gas oils and topped crude, for use in cracking process.....	Imp. gal.	656,962,708		765,115,376	
Lubricating oils and greases—					
Grease, lubricating.....	pound	1,099,891	175,177	1,105,582	185,523
Oils, lubricating.....	gallon	1,542,882	876,679	1,481,328	976,182
Soaps and soap powders.....			48,107		52,629
All other products.....			100,340		31,289
Total.....			1,200,303		1,245,623
Grand Total.....			122,312,800		156,635,495

(1) Includes recoveries from Turner Valley naphtha and natural gasoline run to refinery stills but does not include the imported casinghead gasoline which was used for blending at the refineries.

(2) Includes polymer gasoline.

CHAPTER EIGHT

THE NON-METALLIC MINING INDUSTRIES IN CANADA. (Other than Fuels)

Including detailed data relating to operations in the following industries:—

Asbestos	Miscellaneous	Magnesium sulphate
Feldspar, Nepheline	Barytes	Mineral waters (natural)
Syenite and Quartz	Diatomite	Peat
Gypsum	Fluorspar	Phosphate
Iron oxides (ochre)	Garnet	Pyrites (sulphur)
Mica	Graphite	Silica brick
Salt	Grindstones, etc.	Sodium carbonate
Talc and soapstone	Lithium minerals	Sodium sulphate
	Magnesitic dolomite	Strontium minerals

THE ASBESTOS MINING INDUSTRY, AND THE ASBESTOS PRODUCTS INDUSTRY

Primary or mine sales of asbestos in Canada during 1941 were the greatest ever realized by the Canadian Asbestos Mining Industry. These shipments in 1941 totalled 477,846 short tons valued at \$21,468,840 compared with 346,805 short tons worth \$15,619,865 in 1940. Increases in tonnages over 1940 were as follows: crudes, 38.1 per cent; fibres, 23.2 per cent, and shorts, 53.9 per cent. Crude asbestos rock mined in 1941 totalled 7,707,367 short tons as against 7,612,150 tons in 1940; tons milled during the year under review totalled 6,366,670 tons compared with 5,908,226 tons in 1940. Production in both years came entirely from the province of Quebec.

The number of Canadian asbestos companies reported as active in 1941 totalled 9; capital employed in the industry amounted to \$21,325,558; employees numbered 3,760 against 3,886 in 1940, and salaries and wages distributed aggregated \$4,996,101 compared with \$4,728,702 in the preceding year.

It is also worthy of note that the Canadian asbestos mining industry is now making an additional contribution to Canada's war effort by producing certain essential war materials in the mine machine shops. This auxiliary operation constitutes an important part of the nation's so-called "bits and pieces war time production program".

During 1941, commercial mine shipments of asbestos were reported from the Eastern Townships of Quebec by: Asbestos Corporation Ltd. working the King, Beaver, British Canadian and Vimy mines; Asbestos Crude and Fibre Mines Ltd. from Lot 18 R. 4 Thetford Tp., Bell Asbestos Mines Ltd., Lot 27, R. 5, Thetford Tp.; Canadian Johns-Manville Company, Ltd., Jeffrey mine, Shipton Tp.; Johnson's Company, Lot 27, R. 6, Thetford Tp., and Lot 29 R. B. Coleraine Tp.; Nicolet Asbestos Mines Ltd., Lot 1143 R. 11, Ste. Remi de Tingwick Tp., and Quebec Asbestos Corporation Ltd., East Broughton.

The Bureau of Mines, Ottawa, refers to Asbestos mining in 1941 as follows:

"Asbestos of commerce consists mostly of the three varieties known as chrysotile, amosite, and crocidolite or blue asbestos, with chrysotile being by far the most important and widely used. Three other varieties that have only a very limited field of usefulness are fibrous actinolite, fibrous tremolite, and anthrophyllite.

"The asbestos produced in Canada is all of the chrysotile variety and comes entirely from areas of serpentinized rock in the Eastern Townships of Quebec, where the producing centres are Thetford Mines, Black Lake, East Broughton, Vimy Ridge, and Asbestos. The Canadian deposits are the largest known in the world. Production has been continuous from the Thetford area since 1878 and reserves of asbestos-bearing rock are enormous. Core-drilling to depths greater than 1,700 feet has revealed the presence of fibre comparable in quantity and quality with that in the present workings. Most of the output consists of vein fibre obtained from veins $\frac{1}{4}$ to $\frac{1}{2}$ inch in width, though veins exceeding 5 inches in width do occur. The fibres run cross-wise of the veins and thus the width of the vein determines the length of fibre. Slip fibre, occurring in

fault planes, is obtained largely in the East Broughton area. The average yield of fibre from the Quebec deposits is 5 per cent of the rock mined and 7.0 per cent of the rock milled.

"The asbestos-bearing rock is mined both in open pits and underground. The method of block-caving instituted at the King mine of Asbestos Corporation in 1934, has resulted in a remarkable reduction in cost of mining and improvement in grade of mill feed. This development coming at a time when many of the open pits had been worked almost to the economic depth and operators were faced with rising costs and with the prospect of being unable to recover much valuable rock in the walls of the pits, is of the utmost importance to the industry.

"Small deposits of chrysotile asbestos are known in other parts of Quebec and also in Ontario and British Columbia. Several have been worked from time to time. In 1941 trial shipments of chrysotile were made by Canadian Refractories Limited, from its property at Kilmar, Quebec. This asbestos has a very low content of iron and is entirely free from magnetite, and should be suitable for use in making insulation for electrical machinery.

"No amosite or crocidolite has yet been found in Canada but there are numerous deposits of fibrous tremolite, fibrous asbestos and anthophyllite, which varieties are commercially termed amphibole asbestos. The fibres of these varieties are harsher and weaker than those of chrysotile and are in little present demand. None of these deposits is being worked, although formerly fibrous actinolite was quarried near the village of Actinolite, Hastings county, Ontario, for use in the making of roofing materials. Asbestos deposits reported as having been found in recent years in Manitoba and in northern and western Ontario are of the amphibole varieties. The amphibole fibres are too harsh and brittle to be spun but they have a higher resistance to acids than has chrysotile and it is possible that material from some of the deposits may be suitable for use in acid filters and for other purposes where long harsh fibres are required.

"Little data on world production in 1941 are available, but it is known that Canada maintained her position as the principal asbestos-producing country. Other countries producing relatively large quantities of asbestos are Russia, Rhodesia, Union of South Africa, Swaziland, the United States, and Cyprus. A new deposit of blue asbestos (crocidolite) is being developed in Australia and small shipments of an excellent grade of chrysotile have been made from India. It is reported that a deposit of chrysotile in Venezuela is being developed. The world's largest market for asbestos is in the United States, and Canada's proximity to this market confers very real advantages on the asbestos industry in this country. Another development favouring the Canadian industry is the increasing demand for short grades of fibre for use in newly developed asbestos-cement products, and in moulded plastic articles.

"Most of the Canadian production of asbestos is exported in the unmanufactured state, i.e., either in the crude condition (long-fibred material only), in a partly opened state, or completely fluffed out and ready for manufacture. The great bulk of exports goes to the United States but substantial quantities are also exported to the United Kingdom and Australia. Since September 20, 1939, the Dominion Government has controlled the export of asbestos."

Prices F.O.B. Quebec mines, December 1941, were: No. 1 crude per ton \$700 to \$750 (\$700 to \$750); No. 2 and sundry, crudes, \$150 to \$350 (\$150 to \$350); spinning fibres \$110 to \$200 (\$110 to \$200); various grades shingle stocks \$57 to \$85 (\$57 to \$78); various grades paper stock \$40 to \$49 (\$40 to \$45); cement stock \$22 to \$30 (\$22 to 26); floats \$19 to \$21 (\$19 to \$21); shorts \$13 to \$17.50 (\$13 to \$17.50). Prices December 1940 shown in brackets; all quotations in United States funds, tax and bags included.

Table 180.—Sales and Shipments* of Canadian Asbestos, 1939-1941

	1939		1940		1941	
	Tons	\$	Tons	\$	Tons	\$
Crudes.....	3,121	938,718	2,060	766,562	2,846	980,217
Fibres.....	193,992	(b) 12,049,539	181,581	11,593,844	223,767	14,812,871
Shorts.....	167,359	2,870,955	163,164	3,259,459	251,233	5,675,752
Total.....	364,472	15,859,212	346,805	15,619,865	477,846	21,468,840
Sand, gravel, and stone (waste rock only) (a)	3,897	2,930	6,482	4,791	8,454	6,805

(*) All from the province of Quebec unless otherwise noted.

(a) This production is included under the sand and gravel industry.

(b) Includes 18 tons valued at \$720 produced in Ontario.

Asbestos Rock Mined and Milled 1939-1941

(Tons)

	1939	1940	1941
Quantity of rock mined.....	6,650,416	7,612,150	7,707,367
Quantity of rock milled.....	5,548,765	5,908,226	6,366,670

Table 181.—Sales and Shipments of Asbestos, 1928-1941

Year	Tons	\$	Year	Tons	\$
1928.....	273,033	11,238,360	1935.....	210,467	7,054,614
1929.....	306,055	13,172,581	1936.....	301,287	9,958,183
1930.....	242,114	8,390,163	1937.....	410,026	14,505,791
1931.....	164,296	4,812,886	1938.....	289,793	12,890,195
1932.....	122,977	3,039,721	1939.....	364,472	15,859,212
1933.....	158,367	5,211,177	1940.....	346,805	15,619,865
1934.....	155,980	4,936,326	1941.....	477,846	21,468,840

Table 182.—Consumption of Asbestos in Specified Canadian Industries, 1939-1941

Industry	1939		1940		1941	
	Quantity	Cost at works	Quantity	Cost at works	Quantity	Cost at works
Electrical Apparatus and Supplies—		\$		\$		\$
Board..... pound	179,631	30,521	357,372	61,816		94,358
Yarn..... pound	120,394	46,474	103,932	36,895	131,787	38,712
Tape..... pound	21,350	11,194	29,771	27,708	31,722	29,613
Boilers, Tanks and Engines.....		6,556		10,114		24,378
Asbestos Products—						
Fibre.....						
Other forms.....						
See Asbestos Products Industry						
Roofing paper..... ton	3,740	145,792	2,545	103,810	1,945	59,890
Cotton goods, n.e.s..... pound	1,064	592	10,395	578	10,887	607
Woollen goods, n.e.s..... pound	149,732	40,051	181,264	51,072		Not reported in 1941

Table 183.—Capital Employed in the Asbestos Industry in Canada, 1941

	\$
Present cash value of the land (excluding materials).....	3,220,625
Present value of buildings, fixtures, machinery, tools and other equipment.....	7,028,501
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	1,682,271
Inventory value of finished products on hand.....	1,152,452
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	8,241,709
Total.....	21,325,558

Table 184.—Principal Statistics of the Asbestos Mining Industry in Canada, 1939-1941

	1939	1940	1941
Number of firms.....	8	8	9
Capital employed..... \$	22,489,233	19,799,280	21,325,558
Number of employees—On salaries (c).....	299	320	314
—On wages.....	3,485	3,566	3,446
Total.....	3,784	3,886	3,760
Salaries and wages—Salaries..... \$	608,529	641,770	679,394
Wages..... \$	3,738,535	4,086,932	4,316,707
Total..... \$	4,347,064	4,728,702	4,996,101
Selling value of products (a)..... \$	15,862,142	15,624,656	21,475,645
Cost of fuel and electricity (purchased)..... \$	1,376,568	1,520,907	1,524,460
Cost of process supplies (b)..... \$	2,086,945	2,200,061	2,721,796
Net value of sales..... \$	12,398,629	11,903,688	17,229,399

(a) Includes value of sand and gravel.

(b) Explosives, drill steel, etc.

(c) In 1940 includes 40 females; 41 in 1939 and 45 in 1941.

Table 185.—Wage-Earners Employed, by Months, in the Asbestos Mining Industry in Canada, 1940-1941

Month	1940	1941		
		Mine		Mill
		Surface	Underground	
January.....	3,634	1,205	520	1,347
February.....	3,614	1,232	528	1,388
March.....	3,465	1,258	533	1,403
April.....	3,587	1,252	495	1,391
May.....	3,707	1,349	457	1,392
June.....	3,804	1,423	431	1,436
July.....	3,811	1,511	474	1,569
August.....	3,799	1,503	489	1,648
September.....	3,723	1,484	585	1,737
October.....	3,278	1,522	611	1,688
November.....	3,190	1,471	605	1,680
December.....	3,180	1,474	594	1,672

THE ASBESTOS PRODUCTS INDUSTRY IN CANADA, 1941

Production by the manufacturers of asbestos goods in Canada in 1941 was valued at \$4,359,217, an increase of 70.5 per cent over the 1940 total of \$2,556,278. Products made included brake linings valued at \$1,371,791, boiler and pipe covering at \$611,431, clutch facings at \$199,846, asbestos packings at \$224,870 and such other lines as asbestos gaskets, cloth, yarn, dryer felts, cement, etc.

Eleven factories were engaged in this industry, of which 5 were located in Quebec, 5 in Ontario and 1 in Nova Scotia. Fixed and working capital as represented by these works totalled \$3,459,185; the number of employees averaged 772 for each month of the year and payment in salaries and wages for the year amounted to \$959,268. Expenditures for fuel and electricity totalled \$169,358 and materials for manufacturing cost \$1,866,795.

Table 186.—Materials Used in the Asbestos Products Industry, 1940 and 1941

	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos fibre.....	lb.	12,454,956	229,824	25,098,964	446,301
Asbestos cloth.....	lb.	82,878	32,402	123,403	46,782
Asbestos paper, corrugated and plain.....	lb.	532,115	19,316	779,548	22,037
Asbestos sheets and strips.....	lb.	24,640	13,136	36,428	19,686
Asbestos yarn.....	lb.	401,313	133,006	449,523	170,136
Cotton cloth and yarn.....	\$		113,761		139,255
Rubber and rubber sheets.....	lb.	123,263	27,091	186,034	45,026
Containers and packing material.....	\$		44,740		95,476
All other materials.....	\$		537,313		881,095
Total.....	\$		1,150,499		1,866,795

Table 187.—Products Manufactured in the Asbestos Products Industry, 1940 and 1941

	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Asbestos brake linings—Moulded.....	ft.	3,383,085	735,305	4,690,883	1,172,076
Other.....	ft.	1,190,153	148,606	1,179,926	199,715
Asbestos boiler and pipe covering.....	ft.	2,671,445	250,701	4,122,646	611,431
Asbestos clutch facings.....	no.	611,529	166,406	716,978	199,846
Asbestos gaskets.....	lb.	43,087	23,904	55,638	31,618
Asbestos packings of all kinds.....	lb.	422,118	160,484	519,533	224,870
All other products (*).....			1,070,872		1,919,661
Total.....			2,556,278		4,359,217

(*) Includes products made by 1 or 2 firms, such as, asbestos dryer felt, hydraulic brake hose, asbestos shingles, asbestos yarn, packings of rubber, duck and flax, asbestos paper, asbestos cloth, etc.

FELDSPAR AND QUARTZ MINING INDUSTRY

Owing to the very close physical association of these minerals in many Canadian deposits (pegmatites), it has been found difficult for some operators to make a separation of all data pertaining to the mining of each individual mineral and, for this reason, the general statistics relating to capital, employment, fuel and electricity, etc., have been combined in this report. Since 1936, corresponding statistics relating to the production of nepheline-syenite have been included with those pertaining to the commercial production of feldspar and quartz.

During 1941 the gross value of production by the industry and including the value of feldspar, quartz and nepheline-syenite sold totalled \$1,838,054 compared with corresponding values of \$1,508,999 in 1940 and \$1,352,671 in 1939. In 1941 commercial shipments of feldspar were made only from properties located in Ontario and Quebec; quartz in various forms was produced in Nova Scotia, Quebec, Ontario, Saskatchewan and British Columbia, while production of nepheline-syenite was confined to the province of Ontario.

The number of firms reported as active in the industry in 1941 totalled 38, capital employed was recorded at \$2,314,582, employees numbered 506, salaries and wages paid amounted to \$610,489 and the value of fuel, electricity and process supplies totalled \$250,983. The net value of all products sold was estimated at \$1,587,071 compared with \$1,294,482 in 1940.

FELDSPAR

Production (sales) of feldspar, crude and ground, during 1941 totalled 26,040 short tons valued at \$244,284 compared with 21,455 short tons worth \$187,623 in 1940. Of the 1941 production, 14,218 short tons valued at \$137,160 were mined in the province of Quebec, and 11,822 short tons at \$107,124 in Ontario.

Feldspar mining in Quebec is centered chiefly in the Buckingham district of the Ottawa Valley, while in Ontario the mineral is obtained principally in the Kingston-Perth area and the Nipissing district. Grinding mills are operated at Kingston, Ontario and Buckingham, Quebec.

The following abstracts are from a report prepared by the Bureau of Mines, Ottawa:

"Feldspar has been mined in Canada since 1890. Most of the production has been of high-potash grade, and "No. 1 Canadian" has long been a standard in the ceramic industry as denoting prime quality for porcelain products. Some soda spar also is mined, and is sold for blending and for use in scouring preparations and soaps of the "Bon Ami" type.

"Most of the production comes from adjacent sections of western Quebec and Eastern Ontario, generally in the Ottawa region, with lesser amounts from mines in Ontario as far west as the Parry Sound and Sudbury districts. Formerly, a considerable part of the supply came from a number of small, scattered, and often intermittent operations, but in recent years most of it has come from a few of the larger deposits, the production being about equally divided between Ontario and Quebec.

"World production of feldspar in 1937 (1938-41 not available) amounted to about 500,000 tons, including china stone, a variety of granite used in place of pure feldspar. Canada was sixth on the list, with about four per cent of the total.

"Material for Canadian use is ground in mills operated by the following concerns:

Canadian Flint and Spar Company, Buckingham, Quebec.

Frontenac, Floor and Wall Tile Company, Kingston, Ont.

Bon Ami Company, Montreal East, Quebec.

"The first two companies grind ceramic material while the Bon Ami product is used in making scouring compounds. Canadian Flint & Spar Company expended its grinding capacity in 1941 by the addition of a second Hardinge mill and air separator.

"Owing to shortage of cargo space, shipments of crude and ground feldspar to Great Britain ceased in 1941. The first shipments from Canada to that country were made in 1940, following the cessation of Scandinavian supplies to the British market.

"All of the feldspar used in industry is crushed or finely-ground material, usually prepared either in mills operated by producers of the crude mineral or in merchant mills supplied from independent mines. Some manufacturers of ceramic products mine and grind spar for their own use. Specially selected "dental spar", is used in the manufacture of artificial teeth.

"By far the greater part of the feldspar production is used in the ceramic industries, of which the glass trade is the largest consumer, followed by pottery, enamel, and sanitary ware industries. In the United States, these industries used 98 per cent of total sales in 1940. Minor amounts are used in the manufacture of soaps and cleansers, abrasive wheels, and artificial teeth.

"Domestic feldspar prices in 1941 were the same as in 1940. Crude No. 1 grade, both potash and soda spar, was quoted at \$5.50-\$6.00, f.o.b. rail, for domestic mills and export. Ground spar, 200-mesh, sold at \$16-18, and granular glass spar at \$12, both f.o.b. mill."

Feldspar Prices (October, 1939 to June, 1942)—UNITED STATES—Per ton, f.o.b. North Carolina, potash feldspar, 200 mesh, white, \$17 in bulk; soda feldspar, \$19. F.O.B. Maine, potash feldspar, white, 200 mesh, \$17, in bulk, Granular glass spar, white, 20 mesh, F.O.B. North Carolina, \$12.50 in bulk; semi-granular, \$11.75; soda feldspar, 200 mesh, white, \$19. Virginia, No. 1, 230 mesh, \$18; 200 mesh, \$17; No. 17 glassmakers', \$11.75; No. 18, \$12.50; Enamellers, \$14 to \$16. Quotations on Spruce Pine, N.C., or Keene, N.H., basis. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

Table 188.—Production of Feldspar in Canada, by Provinces, 1931-1941

	Quebec		Ontario		Manitoba		Average value per Ton
	Tons	\$	Tons	\$	Tons	\$	
							\$
1931.....	10,381	86,842	7,962	100,119			10-19
1932.....	3,390	39,062	3,657	42,920			11-63
1933.....	6,183	59,283	4,387	45,350	88	484	9-86
1934.....	9,207	78,853	7,302	61,665	1,793	6,763	8-05
1935.....	7,002	63,075	8,656	75,093	2,084	6,252	8-13
1936.....	8,115	75,703	8,409	70,840	1,322	7,932	8-66
1937.....	12,285	105,612	9,061	72,610			8-35
1938.....	5,874	62,878	8,106	65,964	78	451	9-22
1939.....	5,399	60,923	7,061	51,056	40	330	8-98
1940.....	8,548	89,004	12,907	98,619			8-75
1941.....	14,218	137,160	11,822	107,124			9-38

Values shown in Table 188 include the values of both crude and milled products.

Table 189.—Feldspar Consumed in Specified Canadian Industries, 1940 and 1941

Industries	1940		1941	
	Tons	\$	Tons	\$
Abrasive products.....	68	2,056	84	3,127
Imported clay products.....	3,305	70,788	3,333	74,247
Soaps and cleaning preparations.....	1,085	11,427	3,593	33,411
Iron and steel products.....	542	9,774	(a)	15,683
Glass.....	350	5,744	909	16,656
Enamelling materials.....	400	6,000	523	7,845

(a) Quantity not given in 1941.

NEPHELINE-SYENITE

Production of nepheline-syenite in Canada during 1941 was valued at \$227,583 compared with \$117,849 in 1940. Commercial shipments of the mineral in 1941 were made only by the American Nepheline Corporation; the deposits worked by this Company are located on Lot 14, Concession 9, Methuen Township, Peterborough County, Ontario; milling operations are conducted in a plant located at Lakefield, Ontario, and were continuous throughout the year under review.

The following abstracts are from a report prepared by the Bureau of Mines, Ottawa:

"Nepheline syenite is a quartz-free crystalline rock consisting essentially of the mineral nephelite, a silicate of alumina, potash, and soda, and albite and microcline feldspar. It often contains also varying amounts of iron-bearing minerals in the form chiefly of black mica and magnetite, together with such accessory minerals as zircon, corundum, calcite, scapolite, etc. It has no free silica and is high in alumina (20 to 30 per cent in average commercial rock) as compared with straight feldspar (17 to 20 per cent) and it has thus found favour with the ceramic industries, particularly in the glass trade. For ceramic use the crude rock must be freed of its

iron-bearing constituents, removal of which can often be readily affected by a relatively cheap process of magnetic separation at about 20-mesh size.

"The known occurrences of nepheline syenite in Canada lie mainly in Ontario, the most extensively developed deposits being in Peterborough, Hastings, and Haliburton counties. Production began in 1936 with the opening of a quarry by Canadian Nepheline, Limited at the west end of Blue Mountain in Methuen township, Peterborough county. This company at the same time erected a small plant at Lakefield, the nearest rail point 27 miles distant, for crushing and cleaning the rock. Production for supplying the domestic glass trade has been continuous since then. In 1937-38 production of crude rock was greatly expanded by the formation of a subsidiary, American Nepheline Corporation, which erected a large crushing and processing plant at Rochester, New York, to take care of United States requirements. Present capacity of the Lakefield mill is 45 tons of finished product a day, and the Rochester plant is designed for about 200 tons of feed a day. The main product made in both plants is a granular, minus 20-mesh material, containing about 24 per cent of alumina, and only 0.07 per cent of ferric oxide (Fe_2O_3). The Lakefield mill supplies cleaned material to the mill of Frontenac Floor and Wall Tile Company, Kingston, Ontario, for fine grinding for general ceramic use, and similar fine syenite is being produced at the Rochester plant. In 1940, Canadian Nepheline Limited was merged with American Nepheline Corporation, and is now the latter company's Canadian branch.

"A second important nepheline syenite area lies in the Bancroft-Gooderham district, Hastings and Haliburton counties, about 30 miles northeast of the Methuen deposit. Production began in 1937 and has since been continued intermittently by several operators.

"Frobisher Exploration Company, Limited, a subsidiary of Ventures Limited (which holds the controlling interest in American Nepheline Corporation), conducted an intensively geological and diamond drilling program in 1941 on the nepheline syenite occurrences in the Bancroft area. In connection with this work, a process was developed in the laboratories of the Bureau of Mines, Ottawa, for the production of alumina from the nepheline syenite deposits, having as by-products, potash and soda ash. Canada has been obtaining its bauxite, the ore of aluminium, from the Guianas in South America, and in event that these supplies are cut off, the nepheline syenite could be used to replace the bauxite as a source of aluminium. Nepheline Products, Limited, with office at Lakefield, Ontario, was incorporated in 1941 as a subsidiary of Ventures Limited to attend to outlets for nepheline syenite other than in the ceramic trade.

"Aside from Russia, the output of which is unknown, Canada is the only producer of nepheline syenite. Russia recovers large tonnages of apatite (phosphate) from apatite-nephelite rock, large bodies of which occur in the Kola Peninsula.

"Nepheline syenite continues to be used chiefly in the glass trade, where it is preferred to straight feldspar because of its higher content of alumina. Research has been proceeding steadily on applications for nepheline syenite in other branches of ceramics, and it has been found of advantage owing to its higher fluxing action, as a body ingredient in a variety of products, including pottery, semivitreous ware, sanitary and electrical porcelain, floor and wall tile, and structural clay products, as well as in enamels.

"Glass grade nepheline syenite for sale in Canada remained at the 1940 price of \$11.75 per ton, bulk, in carload lots, f.o.b. Lakefield, with ground, 200-mesh, ceramic grade quoted at \$16.50. Grade B (dust) sold for \$13.00, l.c.l. American prices also remained unchanged, at \$12.00 for glass grade, and \$15.50 for ceramic grade, all bulk, in carload lots, f.o.b. Rochester, New York."

Table 190.—Production of Nepheline-Syenite in Canada*, 1936-1941

Year	Quantities	Value
		\$
1936.....	(a)	(b) 37,426
1937.....	(a)	121,481
1938.....	(a)	142,737
1939.....	(a)	140,148
1940.....	(a)	117,849
1941.....	(a)	227,583

(*) Produced in Ontario only.

(a) Quantity not published.

(b) First commercial production in Canada.

Nepheline-syenite used in Canada in the manufacture of glass totalled 3,472 tons valued at \$58,629 in 1939, 4,233 tons at \$69,619 in 1940 and 5,834 tons worth \$94,901 in 1941.

QUARTZ (SILICA)

The production of natural silica or quartz in Canada during 1941 totalled 2,052,878 short tons valued at \$1,366,187 compared with 1,858,302 tons at \$1,203,527 in 1940. Output of primary silica products by the Canadian Quartz Mining industry includes crude and crushed dyke quartz, quartzite, and natural silica sands and gravels. The mineral in one or more of the forms thus defined was produced during 1941 in Nova Scotia, Quebec, Ontario, Saskatchewan and British Columbia. Shipments of silica in Nova Scotia were made to steel plants largely for the making of silica brick. In Quebec, high grade silica sands were produced for the manufacture of glass and chemicals while a considerable tonnage of these same sands was sold for sand-blasting and various other purposes; in the same province relatively large quantities of crushed quartzite were mined and milled for the manufacture of silicon carbide and other products. The greater part of the tonnage of silica shipped in Ontario during 1941 represented material intended for use in the production of silica brick and ferro-silicon and for the fluxing of nickel-copper ores. Quartz production as recorded for Saskatchewan represented low-grade natural silica sands or gravels shipped as flux to the Flin Flon Smelter of the Hudson Bay Mining and Smelting Co. Ltd. Production in British Columbia in 1941 consisted of quartz shipped to the Trail smelter from the Gypo and Ballarat deposits located near Penticton. The principal new silica producer in Canada during the year under review was J. B. Symington who shipped a relatively large tonnage of quartzite from Bar River, Ontario to the Chromium Mining and Smelting Company Limited, Sault Ste. Marie, Ontario.

The price per ton of the several grades of silica varies greatly depending on its purity and on the purpose for which it is to be used. Silica, on the whole, is a comparatively low-priced commodity, and therefore the location of a deposit with respect to markets is of great importance. According to a report issued by the Bureau of Mines, Ottawa, the larger markets for silica are in the provinces of Quebec and Ontario, and any new deposits being opened up should be within economic reach of either Montreal or Toronto.

QUARTZ CRYSTAL

(United States Bureau of Mines)

"Modern mechanized warfare depends upon instantaneous two-way radio communication, which to be effective must rely upon accurately ground wafers of crystal, two in each circuit; dozens are needed for a single tank or airplane. Brazil remains the only known commercial source of quartz suitable for radio-frequency control, and radio quartz crystal has been classified as a strategic mineral by the Army and Navy Munitions Board.

"Quartz crystals of commercial size, found near Hot Springs, Ark., almost without exception show twinning, and crystal plates made from them do not have piezoelectric properties unless the twinned portion is cut away—a costly process. Cracks and inclusions of other minerals and of air render most domestic crystals and fragments subject to rejection, even before examination for piezoelectric properties.

"In Brazil, the annual production of quartz crystal jumped to over 1,000 short tons in 1940 from about 250 tons in 1937. One-fourth of the output is consumed as piezoelectric (radio) quartz, and the remainder is used as optical, instrument, or fusing quartz. Before 1941 Japan's purchases were the backbone of the Brazilian crystal industry. The United States had comparatively small peacetime requirements and bought only high-grade material.

"In 1941 the Governments of the United States and Great Britain agreed to buy all stocks of Brazilian quartz crystals remaining after their nationals had made purchases for private industry. The Brazilian Department of Mineral Production, Ministry of Agriculture, introduced export control through licensees and levied a 10 per cent tax based upon export prices. Exports may clear only through the ports of Rio de Janeiro and Salvador.

"A schedule of prices for the various grades of crystal as of April 1941 has been reported. For example, "A" (piezoelectric)-grade crystals weighing 1.5 to 2.0 kilograms with growth faces

were quoted at 250,000 milreis a kilogram (about \$6, United States currency, a pound). Owing to tremendous increases in demand and slight revision in specifications for oscillator plates, many of the manufacturers began to use smaller crystals down to 200 grams each. Prices of larger crystals advanced as much as threefold during the year, but even at the peak these represented only a minor factor in the cost of the final product."

No commercial production of quartz crystals has ever been officially reported in Canada. Imported crystals, however, are now being cut and dressed in the Dominion.

"The Mineral Industry" reported exports of Brazilian quartz crystals as follows: 1938, 747 metric tons; 1939, 678 tons. Of 646 tons exported during the first eight months of 1940, 343 tons went to Great Britain, 223 tons to Japan and only 42 tons to the United States. Germany is known to have received ten tons and may have secured part or all of 23 tons to Italy and 5 tons to Netherlands.

Sales of fragments for the production of fused quartz amounts to about half of the sales for electrical and optical work.

Table 191.—Production in Canada of Quartz, 1940 and 1941

	1940		1941	
	Short tons	Value	Short tons	Value
		\$		\$
PRODUCTION* (SHIPMENTS)—				
Nova Scotia.....	8,755	15,670	11,477	24,100
Quebec.....	109,090	321,891	147,318	388,948
Ontario.....	1,581,367	810,285	1,745,244	899,687
Saskatchewan.....	159,090	55,681	148,208	51,873
British Columbia.....			631	1,579
Canada.....	1,858,302	1,203,527	2,052,878	1,366,187

* Includes both crude and crushed quartz and quartzite, silica flux and natural silica sands.

Table 192.—Production* (Use) of Natural Low Grade Silica and Silica Gravel as Non-Ferrous Smelter Flux 1940-1941

	1940		1941	
	Tons	\$	Tons	\$
Ontario.....	1,403,268	491,144	1,533,392	536,687
Saskatchewan.....	159,090	55,681	148,208	51,873
Canada, Total.....	1,562,358	546,825	1,681,600	588,560

* Included in totals shown in Tables 191 and 193 also complete data for production of this material in Ontario previous to 1937 are not available.

Table 193.—Production of Quartz (Silica) in Canada, 1928-1941

Year	Ton	\$	Year	Ton	\$
1928.....	282,522	523,933	1935.....	233,002	424,882
1929.....	265,949	561,527	1936*.....	1,046,649	597,781
1930.....	226,200	418,127	1937*.....	1,377,448	1,129,011
1931.....	195,724	303,158	1938*.....	1,380,011	961,617
1932.....	189,132	276,141	1939*.....	1,582,935	1,100,214
1933.....	185,785	297,824	1940*.....	1,858,302	1,203,527
1934.....	272,565	482,265	1941*.....	2,052,878	1,366,187

* See footnote to Table 192.

Prices—UNITED STATES (May, 1941 to June, 1942)—Silica, per ton, water ground and floated, in bags, f.o.b. Illinois: 325 mesh, \$21 to \$40 for 92 to 99½ per cent grades. Dry ground, air floated, 325 mesh, 92 to 99½ per cent silica, \$18 to \$30. Glass sand, f.o.b. producing plant, \$1.25 to \$5 per ton; molding sand, 50 cents to \$3.50; blast sand, \$1.75 to \$6. California: \$5 for quartz and \$2.50 for sand. Quartz rock crystals for fusing, all sizes, \$100 to \$150 per ton; prisms for piezo-electrical and optical use command premium. (Engineering and Mining Journal's "Metal and Mineral Markets"—New York).

"Canadian Chemistry and Process Industries"—Toronto—quotations (March, 1941)—silica sand, various grades, carlots, ton \$8 to \$9.50. Silica quartz 99 per cent, 110-220 grade, carlots—to \$15 per ton. The price for the lower grades of crude quartz varies greatly according to purity and purpose of use.

Table 194.—Consumption of Quartz, Silica Sand, etc., in Canada, by Industries, According to Census of Industry Reports, 1940 and 1941

Industry	1940		1941	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
SILICA, SAND AND SILICA (including ground quartz)—				
Soaps and cleaning preparations.....	4,873	81,894	4,347	92,870
Acids and salts.....	19,256	90,545	24,327	109,402
Paints.....	823	25,217	1,019	39,365
Refractories.....	690	4,889	578	7,252
Roofing paper.....	1,833	10,261	2,641	15,135
Abrasives (Silica sand).....	45,982	221,925	57,362	269,605
Abrasives (Quartz).....	139	5,577	174	6,624
Glass.....	78,955	439,540	114,761	713,677
Enamelling materials.....	483	7,245	595	8,925
Products from imported clays.....	3,426	53,690	4,055	63,116
Foundry facings and supplies.....	72	934	99	1,242
Non-ferrous smelters†.....	1,562,358	546,825	1,682,231	590,139
Iron and steel industry (silica sand).....	41,232	302,171	82,701	573,305
Ferro-alloys (quartzite).....	115,868	272,953	164,390	390,619
Total accounted for.....	1,875,990	2,063,666	2,119,280	2,881,276

NOTE.—Consumption values are costs at works.

† The quantities reported under this industry represent low grade natural silicious sands used for fluxing purposes. In addition to the quantities shown, a relatively large quantity of quartz and quartzite is consumed in the manufacture of silica brick.

Table 195.—Principal Statistics of the Feldspar and Quartz Mining Industry, 1940 and 1941

	ONTARIO (*) (b)		QUEBEC	
	1940	1941	1940	1941
Number of firms (a).....	17	18	27	20
Capital employed..... \$	604,687	650,405	1,568,571	1,664,177
Number of employee—On salary.....	14	17	19	15
On wages.....	176	207	191	267
Total.....	190	224	210	282
Salaries and wages—Salaries..... \$	22,508	25,210	18,137	26,927
Wages..... \$	189,583	253,443	147,026	304,909
Total..... \$	212,091	278,653	165,163	331,836
Selling value of products (gross)..... \$	1,098,104	1,311,946	410,895	526,108
Cost of fuel and purchased electricity..... \$	40,380	42,709	35,754	48,456
Cost of process supplies..... \$	88,521	97,954	49,962	61,864
Net value of sales..... \$	969,203	1,171,283	325,279	415,788

(*) In 1940 includes 1 firm operating in Nova Scotia and 1 in Saskatchewan. In 1941 includes 1 firm in Nova Scotia, 1 in British Columbia and 1 in Saskatchewan.

(a) Small shippers from whom reports were unobtainable and whose production is recorded from consumers' returns are sometimes not included in the total.

(b) Includes data relating to production of nepheline-syenite.

Table 196.—Capital Employed in the Feldspar and Quartz Mining Industry, in Canada, 1941

	Quebec †	Ontario
CAPITAL EMPLOYED AS REPRESENTED BY—	\$	\$
Present cash value of the land (excluding minerals).....	536,709	112,738
Present value of buildings, fixtures, machinery, tools and other equipment.....	975,331	383,360
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	50,570	111,566
Inventory value of finished products on hand.....	25,270	390
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	87,497	31,151
Total.....	1,675,377	639,205

† Includes 1 firm in Nova Scotia.

Table 197.—Number of Wage-Earners on Payroll, by Months, 1940-1941

Month	1940	1941		
		Quebec	Ontario	Canada*
January.....	284	119	171	290
February.....	289	145	152	297
March.....	338	162	174	336
April.....	327	223	209	432
May.....	379	307	227	553
June.....	409	314	246	579
July.....	400	334	234	587
August.....	451	342	243	604
September.....	428	322	210	551
October.....	430	301	217	537
November.....	375	329	203	549
December.....	301	316	146	477

(*) Includes a few employees in some months in Nova Scotia. Complete data relating to quartz production in British Columbia in 1941 are not available.

THE GYPSUM INDUSTRY

(1) Primary Production—The Gypsum Mining and Quarrying Industry

Production (producers' sales and consumption) of gypsum in Canada during 1941 totalled 1,593,406 short tons valued at \$2,248,428 compared with 1,448,788 short tons at \$2,065,933 in 1940. The tonnage in both years represents various grades of crude gypsum and anhydrite shipped from quarries or mines together with the tonnage of calcined gypsum used in or shipped from quarry or "primary" plants. The quantity of the mineral produced in 1941 established an all-time high record in the history of the Canadian gypsum mining industry; the value, however, was exceeded annually during the years 1925-1930 inclusive.

Of the 1941 output, Nova Scotia properties contributed 1,395,172 tons valued at \$1,517,297; Ontario, 90,599 tons at \$276,459; New Brunswick, 56,172 tons at \$150,530; Manitoba, 27,601 tons at \$162,822, and British Columbia, 23,862 tons worth \$141,320.

The quantity of crude gypsum mined in 1941 amounted to 1,532,228 short tons while the tonnage of anhydrite mined (all in Nova Scotia) totalled 28,212 short tons. Crude gypsum calcined in primary or quarry plants totalled 197,413 short tons.

The following are the average prices per short ton recorded in 1941 by the industry for total sales of various grades, including anhydrite: crude lump, \$1.31; crushed crude, \$1.10 and ground crude, \$7.44.

In 1941 the number of firms reporting production was 8 and the gypsum quarries and mines in operation totalled 15. Some of the Canadian gypsum mining companies confine their operations in the Dominion to the production and sale of crude gypsum or anhydrite, while others, in addition to marketing various grades of crude gypsum, produce a calcine for sale or for consumption in their own gypsum products plants. Gypsum is exported from Canada almost entirely in the crude form.

Capital employed by Canadian gypsum mining companies totalled \$5,175,821 in 1941; employees aggregated 648; salaries and wages paid amounted to \$745,008 and the total value of fuel, purchased electricity and process supplies used was computed at \$452,008.

During 1941 both the quarry and mill of the Canadian Gypsum Company Limited, near Windsor, Nova Scotia, were in operation from April 1; both anhydrite and crushed gypsum were exported to the United States from this property. In Hants County, Nova Scotia, the Connecticut Adamant Plaster Company operated its Cheverie quarry from June to December and exported crude lump gypsum to its plants in the United States. Crushed gypsum was shipped for Canadian consumption by Gypsum, Lime and Alabastine, Canada, Limited from Baddeck, Nova Scotia. The Victoria Gypsum Company Limited operated at Little Narrows, Victoria County, Nova Scotia, and commercial shipments of crushed gypsum were made to both Canadian and United States markets. At Windsor, Nova Scotia, the Windsor Plaster Company Limited operated both its quarry and manufacturing plant; this company produces hardwall plasters and other gypsum products.

National Gypsum (Canada) Limited, operating in Nova Scotia, reported that operations at its Cheticamp mine and mill were restricted to shipping and maintenance; shipments from this property consisted solely of crushed gypsum. The company carried on both mining and milling operations at Walton from April 15 until the close of the year. Production from the Walton mill represented the mineral in the crushed form. Mining operations were conducted by this same company at its Dingwall quarry from March 15 to December 20; the Dingwall mill was active throughout the entire year and large tonnages of crushed gypsum were shipped to both United States and Canadian consumers.

Gypsum was produced in New Brunswick in 1941 only by the Canadian Gypsum Company Limited. This company operates at Hillsboro and carried on both mining and milling operations throughout the year under review. Crude gypsum was shipped in the crushed state while large quantities of the mineral in the calcined form were used by the company in its manufacturing plant for the production of wallboard and various other gypsum products; underground mining is conducted at Hillsboro.

In Ontario, gypsum was mined in 1941, at Caledonia by Gypsum, Lime and Alabastine, Canada, Limited and at Hagersville by the Canadian Gypsum Company Limited. Underground mining was carried on by both these companies throughout the year. Manufacturing plants are operated by these firms for the production of a wide range of gypsum products.

At Amaranth, Manitoba, underground mining operations were reported during most of the year by Western Gypsum Products Limited. The milling and manufacturing plants of this company, located in Winnipeg, were also active throughout 1941. Gypsum used in 1941 by Gypsum, Lime and Alabastine Canada, Limited, in its Winnipeg plant was obtained from the company's quarry located at Gypsumville. In addition to the gypsum used by these companies, in their own plants, considerable quantities of the crude mineral, in the crushed or ground state; were marketed in the Prairie Provinces.

In British Columbia quarrying operations were carried on during 1941 by Gypsum, Lime and Alabastine, Canada, Limited at Falkland. Gypsum mined from the Falkland deposit was shipped to the company's mill and manufacturing plant located at New Westminster. In addition to the mineral used for manufacturing gypsum products in its New Westminster plant, the company shipped relatively large tonnages of crude milled gypsum to points in both British Columbia and Alberta. During 1941 Messrs. Rogers and Little mined a comparatively small tonnage of gypsite at Knutsford, in the Kamloops district; this was marketed in the Fraser Valley.

The following information was abstracted from a report prepared by the Bureau of Mines, Ottawa:—

"The world production of gypsum is estimated at between 9 and 10 million metric tons. Canada probably occupies third rank among the world's producers.

"Gypsum is marketed in the crude lump form, ground as 'land plaster' and 'terra alba', or ground and calcined, as plaster of Paris or wall plaster. Each year an increasing portion of the calcined material enters into the manufacture of wall-board, gypsum blocks, insulating material, acoustic plaster, etc. Anhydrite is used mainly as a fertilizer for the peanut crop in the Atlantic seaboard states of the southern United States.

"The use of anhydrite in England for the manufacture of sulphuric acid, ammonium sulphate, cement and special plasters is increasing, and in normal times there is a good opportunity for the Canadian material in this market. Canada is fortunate in having extensive deposits, favourably situated for commercial exploitation, the material from which has been proved by tests carried out by the Department of Mines and Resources to be of excellent grade. Prior to 1937 the small production in Canada was exported principally for use as a fertilizer for the peanut crop, but it is possible that an industry will be started in this country in which the anhydrite may be used for the manufacture of sulphur or sulphur compounds as well as of special plasters, similar to those now being marketed in England.

"The gypsum industry, which is entirely dependent on the building industry, has not shown as rapid a rate of increase as some of the other industries. Nevertheless, the improvement in recent years has been quite marked.

"The use of gypsum products in the building trades has made rapid progress because of their lightness, durability, fire-resisting, insulating and acoustic properties; and tiles, wallboards, blocks, and special insulating and acoustic plasters have been developed. It is probable that production of gypsum for domestic use will continue to decline during the war, but as most of the crude gypsum is shipped to the United States for the manufacture of gypsum products, industrial conditions in that country will continue to have an important bearing on the industry.

"Crude gypsum is a low priced commodity, and its selling price f.o.b. quarry is dependent largely upon the quantity produced and the production facilities available. For export, contracts are generally made with the producer for the year's requirements of the purchaser and these contracts are generally made early in each year."

Table 198.—Production in Canada, of Gypsum, 1940 and 1941

	1940		1941	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
SHIPMENTS BY GRADES—				
Crude (1)—Lump or mine run.....	21,101	23,201	39,776	52,156
Crushed.....	1,296,769	1,331,843	1,396,364	1,541,431
Fine ground.....	521	2,961	277	2,061
Calcined, gypsum, sold and used (2).....	130,397	707,928	156,989	652,780
Total.....	1,448,788	2,065,933	1,593,406	2,248,428
SHIPMENTS BY PROVINCES—				
Nova Scotia.....	1,278,204	1,302,347	1,395,172	1,517,297
New Brunswick.....	52,218	192,980	56,172	150,530
Ontario.....	75,271	313,512	90,599	276,459
Manitoba.....	23,108	137,051	27,601	162,822
British Columbia.....	19,987	120,043	23,862	141,320
Total.....	1,448,788	2,065,933	1,593,406	2,248,428
Total gypsum mined and quarried (1).....	1,540,795		1,560,440	
Total gypsum calcined (2).....	156,372		197,413	

(1) Includes some anhydrite quarried in Nova Scotia.

(2) Does not include gypsum calcined in manufacturing plants located in Montreal and Calgary, but includes calcine used in manufacturing plants operated in direct conjunction with the mines—the value of calcine used is its value as a process material.

Table 199.—Production (Sales) of Crude and Calcined Gypsum in Canada, 1932-1941

Year	Tons	Value
		\$
1932.....	438,629	1,080,379
1933.....	382,736	675,822
1934.....	461,237	863,776
1935.....	541,864	932,203
1936.....	833,822	1,278,971
1937.....	1,047,187	1,540,483
1938.....	1,008,799	1,502,265
1939.....	1,421,934	1,935,127
1940.....	1,448,788	2,065,933
1941.....	1,593,406	2,248,428

Table 200.—Annual Production of Gypsum in Canada, by Provinces, 1936-1941

Year	Nova Scotia		New Brunswick		Ontario		Manitoba		British Columbia		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value†
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1936....	729,019	808,294	38,470	123,560	40,191	182,783	12,064	87,076	14,078	77,258	833,822	1,278,971
1937....	926,796	978,288	36,906	131,727	53,780	233,895	13,941	88,095	15,764	108,478	1,047,187	1,540,483
1938....	870,850	908,383	48,418	159,203	57,503	242,470	14,571	92,129	17,451	100,080	1,008,799	1,502,265
1939....	1,298,618	1,340,830	29,765	134,286	59,440	260,792	15,961	98,578	18,150	100,641	1,421,934	1,935,127
1940....	1,278,204	1,302,347	52,218	192,980	75,271	313,512	23,108	137,051	19,987	120,043	1,448,788	2,065,933
1941....	1,395,172	1,517,297	56,172	150,530	90,599	276,459	27,601	162,822	23,862	141,320	1,593,406	2,248,428

† Gross.

Table 201.—Consumption of Gypsum in Canadian Cement Industry, 1932-1941

Year	Tons	Year	Tons
1932.....	27,537	1937.....	33,691
1933.....	13,319	1938.....	51,975
1934.....	19,172	1939.....	31,492
1935.....	21,611	1940.....	38,903
1936.....	25,447	1941.....	49,031

Table 202.—Principal Statistics of the Gypsum Mining Industry in Canada, 1939-1941

	Nova Scotia	New Brunswick, Ontario, Manitoba, British Columbia	Total Canada
Number of firms—1939.....	7	3(a)	10
1940.....	6	3(a)	9
1941.....	6	2(a)	8
Capital employed—1939..... \$	4,370,893	2,436,014	6,806,907
1940..... \$	2,408,561	2,242,101	4,648,662
1941..... \$	2,812,465	2,363,356	5,175,821
Number of employees—On salary—			
1939.....	29	37	66
1940.....	33	24	57
1941.....	34	14	48
On Wages—			
1939.....	440	208	648
1940.....	389	248	637
1941.....	328	272	600
Salaries and wages—Salaries—			
1939..... \$	53,680	59,235	112,915
1940..... \$	60,374	51,048	111,422
1941..... \$	62,083	28,852	90,935
—Wages—			
1939..... \$	402,134	177,109	579,243
1940..... \$	369,090	237,154	606,244
1941..... \$	338,356	315,717	654,073
Fuel and electricity—Cost—			
1939..... \$	90,394	103,094	193,488
1940..... \$	76,224	118,740	194,964
1941..... \$	73,784	148,780	222,564
Value of process supplies used—			
1939..... \$	85,166	20,665	105,831
1940..... \$	194,005	29,370	223,375
1941..... \$	199,875	29,569	229,444
Selling value of products (gross)—			
1939..... \$	1,340,830	594,297	1,935,127
1940..... \$	1,302,347	763,586	2,065,933
1941..... \$	1,517,297	731,131	2,248,428

(a) Includes 2 companies also operating in Nova Scotia.

Table 203.—Capital Employed in the Gypsum Industry in Canada, by Provinces, 1941

	Nova Scotia	New Brunswick, Ontario, Manitoba and British Columbia	Canada
Capital employed as represented by—	\$	\$	\$
Present cash value of the land (excluding minerals).....	30,005	199,393	229,398
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,451,898	917,505	2,369,403
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	104,987	103,388	208,375
Inventory value of finished products on hand.....	366,574	52,920	419,494
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)...	859,001	1,090,150	1,949,151
Total.....	2,812,465	2,363,356	5,175,821

Table 204.—Number of Wage-Earners on Payroll or Time Record on the Last Day of Each Month or Nearest Work-Day, 1940 and 1941

Month	1940		1941		
	Mine	Mill	Mine		Mill
			Surface	Under-ground*	
January.....	201	107	142	68	128
February.....	214	106	130	75	125
March.....	295	135	160	72	142
April.....	317	134	335	78	219
May.....	551	198	400	81	197
June.....	484	192	427	101	224
July.....	647	198	465	101	216
August.....	710	248	375	108	236
September.....	700	218	407	98	228
October.....	614	234	350	95	229
November.....	436	172	337	86	229
December.....	345	150	285	83	170

* Underground work confined to New Brunswick, Ontario and Manitoba.

(2) The Gypsum Products Industry

Nine Canadian factories, operated by four companies, manufactured gypsum products having a factory selling value of \$4,601,093 during 1941. This output was 11.9 per cent over the 1940 total of \$4,110,795 and 44.9 per cent over the 1939 value of \$3,174,137. The main products were gypsum wallboard, gypsum hardwall plaster, gypsum tile and gypsum blocks.

Capital employed in these nine manufacturing plants amounted to \$3,431,883 in 1941, including \$1,668,647 as the value of buildings and equipment, \$526,925 as the value of inventories at the year-end and \$1,236,311 as cash, bills receivable, etc. The average number of employees in 1941 was 374 to whom \$464,776 was paid in salaries and wages. Expenditures for fuel and electricity amounted to \$191,685, while materials used in manufacturing processes cost \$1,941,052.

Table 205.—Materials Used in the Gypsum Products Industry, 1940 and 1941

Material	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Gypsum, crude.....	ton	21,611	75,946	30,978	112,158
Gypsum, calcined (plaster of Paris).....	ton	125,917	660,502	157,488	628,325
Paper.....	ton	9,056	491,035	13,106	718,914
Starch or paste.....	ton	262	18,803	487	42,310
Hair.....	ton	111	17,933	122	23,293
Retarder.....	ton	267	20,329	286	23,330
Sawdust or shavings.....	ton	1,176	5,577	751	5,481
Containers, etc.....			126,794		124,660
All other materials.....			213,900		262,581
Total.....			1,630,819		1,941,052

Table 206.—Output of the Gypsum Products Industry, 1940 and 1941

Products	Unit of measure	1940		1941	
		Quantity	Selling value at works	Quantity	Selling value at works
			\$		\$
Gypsum wallboard.....	sq. ft.	114,533,870	2,712,355	54,760,145	3,255,618
Gypsum hard wall plasters.....		69,889	897,932	80,216	1,043,864
All other products (*).....			500,508		301,611
Total.....			4,110,795		4,601,093

(*) Includes gypsum tile, gypsum blocks, etc.

IRON OXIDES (OCHRE) MINING INDUSTRY

Production (producers' sales) in Canada of iron oxides and ochres, crude and refined during 1941 totalled 10,045 short tons valued at \$142,069 compared with 9,979 short tons worth \$111,874 in 1940. Of the 1941 output, 9,770 short tons valued at \$139,185 came from properties in the province of Quebec and the balance of 275 tons at \$2,884 represented crude material shipped from deposits located in British Columbia.

During 1941 iron oxides were produced in the province of Quebec at Pointe du Lac, Alma-ville, Les Forges and Red Mill. One firm produced refined products while crude material was shipped by other operators; the mineral in the crude form was consumed largely in the purification of manufactured gas.

The balance of Canadian iron oxide production in 1941 originated in British Columbia where shipments of the mineral in the crude state were made from deposits located at Alta Lake; these shipments were consigned to gas plants located in Vancouver and Victoria, B.C.

Table 207.—Production (Sales) in Canada of Iron Oxides, 1941 and 1940

	1941		1940	
	Quantity	Value	Quantity	Value
		\$		\$
Quebec (*).....	9,770	139,185	9,603	107,926
British Columbia.....	275	2,884	376	3,948
Total.....	10,045	142,069	9,979	111,874

(*) Includes crude and refined grades.

Table 208.—Production of Iron Oxides in Canada, 1932-1941

Year	Quantity	Value
	Short tons	\$
1932.....	5,240	46,161
1933.....	4,357	53,450
1934.....	4,959	66,168
1935.....	5,516	77,075
1936.....	5,854	69,630
1937.....	6,197	83,640
1938.....	5,821	71,769
1939.....	6,015	88,418
1940.....	9,979	111,874
1941.....	10,045	142,069

The production of iron oxides in Canada since the first recording of statistics in 1886 to the end of 1941 totalled 307,409 short tons valued at \$3,121,907.

Table 209.—Consumption of Iron Oxides in Specified Canadian Industries, 1932-1941

Years	Coke and gas		Paints, pigments and varnishes		Paints, pigments and varnishes	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons (a)	\$	Tons (b)	\$	Tons (c)	\$
1932.....	3,736	35,284	701	52,323	512	48,047
1933.....	2,734	29,076	504	43,826	491	43,671
1934.....	3,757	47,010	580	53,539	544	53,236
1935.....	3,701	46,204	990	77,758	564	56,219
1936.....	(d)	41,291	733	67,850	634	65,819
1937.....	(d)	40,414	890	81,709	566	49,082
1938.....	(d)	41,013	822	70,736	487	41,062
1939.....	(d)	35,417	882	80,274	523	47,134
1940.....	5,417	42,401	1,145	112,825	575	62,636
1941.....			1,602	187,836	464	58,385

(a) Oxide and purifying materials.

(b) Iron oxide pigments.

(d) Ochres, siennas and umbers.

(d) Data not available

The following information relating to iron oxides has been abstracted from a report prepared by the Bureau of Mines, Ottawa:

"Ochreous iron oxide, which is sold uncalcined and used chiefly in the purification of illuminating gas, comprises the bulk of the minerals produced under this category. The calcined form of ochreous iron oxide is used in the manufacture of paints. A smaller quantity of natural iron oxides associated with clay-like materials in the form of umbers and siennas is produced in the raw and the calcined state for use as pigments in paints.

"The Canadian iron oxide industry is small and the quantity produced shows little change from year to year. Present producing localities have met the requirements of the domestic pigment trade for the cheaper grades for many years. The production for some time past has come mostly from deposits near Trois Rivières, Quebec. In 1941, Sherwin-Williams Company of Canada operated deposits at Red Mill and near Champlain in Champlain county. It was the only producer of calcined iron oxides, the others having marketed only air-dried products.

"A small production of iron oxide from Alta Lake, New Westminster district, and from oxide beds in the Windermere district, British Columbia, has been reported since 1923. The oxide is used chiefly for gas purification. Commercial shipments in 1941 were reported only from the Alta Lake deposits.

"Other deposits could be worked in Quebec and Ontario, if the demand warranted their development. In Nova Scotia, beds of ochre and umber were operated to a small extent in the past. In Alberta and Saskatchewan, several deposits of ochre are known, some having commercial possibilities, but as they are difficult of access and as the market is limited, they have had little development. Large deposits near Grand Rapids and Cedar Lake in northern Manitoba remain undeveloped for similar reasons.

"The demand within the country for these products is fair. Most of the higher grade oxides, ochres, and umbers used in the paint trade were formerly imported from Europe, and prior to the war, some of the cheaper grades of European oxides even competed with the domestic products, as they do not require calcining to produce the desired colour.

"The price in New York of iron oxide, standard No. 1 quality, Spanish red, remained normally at 3 to 5 cents per pound throughout 1941. The average Canadian selling price of crude ochre was \$3.38 a ton, and that of calcined oxides about \$45.00 a ton, f.o.b. plant."

Table 210.—Principal Statistics of the Natural Iron Oxides Industry in Canada, 1940-1941

	1940	1941
Number of firms.....	7(b)	4(a)
Capital employed..... \$	195,263	189,877
Number of employees—On salaries.....	5(c)	6(c)
On wages.....	41	37
Total.....	46	43
Salaries and wages—Salaries..... \$	7,896	8,571
Wages..... \$	30,946	33,581
Total..... \$	38,842	42,152
Selling value of products (gross)..... \$	111,874	142,069
Cost of fuel and purchased electricity..... \$	17,598	15,697
Cost of process supplies..... \$	435	5,697
Selling value of products (net)..... \$	93,841	120,675

(a) Three producing in Quebec and one in British Columbia.

(b) Five producing in Quebec and two in British Columbia.

(c) One female.

Table 211.—Capital Employed in the Iron Oxides Industry in Canada, 1941

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	37,776
Present value of buildings, fixtures, machinery, tools and other equipment.....	91,341
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	39,014
Inventory value of finished products on hand.....	16,746
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	5,000
Total.....	189,877

Table 212.—Wage-Earners Employed, by Months, 1941 and 1940

Months	Number				Months	Number			
	1941		1940			1941		1940	
	Mine	Mill	Mine	Mill		Mine	Mill	Mine	Mill
January.....		25	12	24	July.....	31	18	44	16
February.....		26		28	August.....	31	20	43	17
March.....		25	9	26	September.....	28	20	31	19
April.....		25		23	October.....	15	22	25	17
May.....	8	28	11	22	November.....	17	20	15	20
June.....	34	17	33	16	December.....	8	22	6	21

THE MICA MINING INDUSTRY

Canadian production (mine shipments) of mica in 1941 totalled 3,487,891 pounds valued at \$335,288 compared with 1,950,219 pounds worth \$237,145 in 1940. Shipments during 1941 were made only from properties located in the provinces of Quebec, Ontario and British Columbia. Of the total output in 1941, mines in the province of Quebec contributed 1,603,575 pounds valued at \$284,563; Ontario mines, 1,587,316 pounds worth \$47,047; and British Columbia, 297,000 pounds at \$3,678. In these statistics of mica production are shipments of all grades of the mineral produced, including hand cobbled, thumb-trimmed, splittings, knife trimmed, scrap, ground and mica schist.

The number of Canadian mica operators reporting commercial shipments in 1941 totalled 75; capital employed by the industry amounted to \$1,180,097, and \$181,800 were distributed in salaries and wages to 246 employees. The total net value of shipments was estimated at \$295,759.

The following has been abstracted from a report on mica prepared by the Bureau of Mines, Ottawa:

"Canada has the distinction of being one of the two main world sources of phlogopite or amber mica, the other being the French possession Madagascar.

"Muscovite, or white mica, is of fairly common occurrence in Canada, but in general, deposits of this type of mica have proved of small economic importance owing either to the poor grade of material or to the small amount of mica present, and production of muscovite has been negligible.

"Most of the production of phlogopite has been derived from a comparatively restricted area in adjacent parts of Ontario and Quebec, in the general Ottawa region, and extending roughly from Kingston, on Lake Ontario, northeastward into Gatineau and Papineau counties, Quebec. In Quebec, the mica-bearing series extends for some distance west and east of the main productive district, into Pontiac and Argenteuil counties, respectively, and there are also several scattered occurrences as far east as Quebec City. In Ontario, similar outlying deposits extend westwardly into Hastings and Haliburton counties. In recent years, most of the productive activity has been centered on deposits in Quebec.

"Leading producers of amber mica in 1941 were Messrs. Blackburn Brothers, who operate the old Nellis mine, in Hull township, Quebec; St. Lawrence Mica Corporation, with a mine at Petit Pre, near Quebec City; E. Wallingford, at Perkins, Templeton township, Quebec; and in Ontario, the Kingston Mica Mining Company, which operates the Thirty Island Lake mine in Bedford township, near Godfrey, and the Loughborough Mining Company Limited, Sydenham. These properties accounted for most of the output, the remainder being derived from a number of small and mostly intermittent operations, most of them in Quebec. Late in the year, Messrs. Blackburn Brothers took over the old Phosphate King mine, in Templeton township, Quebec, and proceeded with plans for development of the property. Scrap mica continued to be recovered from old waste dumps, from which some merchantable sheet was also salvaged. The scrap is mostly exported to a grinding plant of United States Mica Manufacturing Company, at East Rutherford, New Jersey, and Chicago, Illinois.

"The larger Canadian producers operate their own mica shops, but there are also dealers who purchase rough-trimmed or mine-run mica from small operators and trim, grade, and split it for sale, either to other dealers and brokers, or to consumers. In smaller rural communities, much of the work, particularly splittings, is farmed out, the labour being performed mostly by girls on piecework.

"Black mica (biotite or lepidomelane) occurs in considerable quantity in Faraday township, near Bancroft, in Hastings county, Ontario, and the deposits were worked some years ago to supply a grinding mill, now inactive, at Bancroft. This mica occurs in very large sheets, but is mostly of poor splitting quality and too high in iron for general electrical use, though some has found employment in low-voltage domestic heater appliances.

"Although muscovite, or "white" mica, is widely distributed in the Precambrian rocks of Eastern Canada and in certain areas of western Ontario, Manitoba, and British Columbia, production has been negligible. In general, it has been found that the proportion of sound, merchantable sheet in the pegmatites is too low for the profitable mining of this mineral alone. During the past three years, there has been much prospecting and some mining activity on scattered muscovite occurrences in Quebec, mainly in the Lake St. John-Saguenay region.

"An outstanding recent development has been the discovery in Bergeronnes township, east of the Saguenay river, of a deposit of high-grade "ruby" muscovite, comparable in quality to the best Indian or Brazilian mica. This property which is owned by Eugene Simard, of Grandes Bergeronnes, came into production on a small scale in 1940, but was reported inactive in 1941. A few small sales of muscovite were made in 1941 from deposits in the Mattawa, Lakefield, Kaladar, and Parry Sound districts, Ontario.

"In recent years, a small production of fine flake muscovite, or sericite, has been obtained from a deposit at Baker Inlet, near Prince Rupert, British Columbia. This material, which amounted to 100 tons in 1941, is shipped to Vancouver for grinding. In 1941 Messrs. Fairey and Company, 661 Taylor Street, Vancouver, who grind the fine flake muscovite from Baker Inlet, took about 100 tons of grinding scrap from a deposit near Oliver, B.C.

"The mica-grinding plant of Messrs. Blackburn Bros., Blackburn Building, Ottawa, in Templeton township, Quebec, continued to produce various mesh sizes of ground amber mica from mine and shop scrap, the demand being reported active and the volume of sales nearly double the 1940 figure.

"Latest available statistics indicate that in 1938 total recorded world production of mica of all classes and grades was about 31,000 long tons, but of this total, over 22,000 tons was low-priced grinding scrap. The remainder comprised both sheet or block mica in various styles of trimming and splittings. Most of this was muscovite, as only Canada and Madagascar, which together produced a little more than 1,000 tons, are producers of phlogopite. India has for many years been the world's chief source of mica, both block and splittings, and in 1938 exported almost 9,000 tons. Brazil recently has been making rapid headway as a second important source of high-grade muscovite; exports from that country in 1940 totalled 1,117 metric tons, or nearly three times the 1939 figure. Canada's share of the world production, though relatively small, is important, as for certain uses, notably for heater plate, commutator insulation, and heavy-duty aviation sparkplugs, amber mica has definite superiority over muscovite.

"Mica prices are difficult to determine owing to the lack of reliable market quotations and to the prevailing system of trade discounts. Quality has such a bearing on value that the only satisfactory method of getting information is to submit samples to an accredited dealer for a quotation. The mica market is subject to pronounced periodic fluctuations in demand owing to prevailing trade conditions, and to the practice by consumers of laying in stocks well ahead of current requirements. According to dealers' reports, general retail price averages for phlogopite in 1941 advanced slightly from those of 1940, quotations being approximately as given below. These prices, however, are not an index of what producers may expect to receive from dealers for small parcels, as they include the dealers' overhead, culling, grading, and marketing costs, profit, etc.

Knife-trimmed Sheet		Splittings	
Size	Per Pound	Size	Per Pound
	\$ cts.		\$ cts.
1 x 1 inches.....	0-30	1 x 1 inches.....	0-65
1 x 2 ".....	0-40	1 x 2 ".....	0-70
1 x 3 ".....	0-65	1 x 3 ".....	0-75
2 x 3 ".....	0-95		
2 x 4 ".....	1-35		
3 x 5 ".....	2-25		
4 x 6 ".....	2-50		
5 x 8 ".....	3-50		

"Ground mica (phlogopite) continued to sell as follows, according to fineness: 20 mesh, \$25 per ton; 60 mesh, \$30; 120 mesh, \$55; 150 mesh, \$65; all prices f.o.b. Ottawa, in ton lots, bags extra.

"There is very little trade in sheet muscovite mica in Canada, though some of the smaller electric appliance manufacturers and repair shops purchase odd lots of domestic material. Consequently no indication of prices can be given. Most of the Canadian requirements are met by direct imports of Indian sheet and splittings. With possible curtailment of Indian supplies, however, a more ready market for domestic muscovite may develop, and the Mica Company of Canada, Lois Street, Hull, Quebec, has advised the Bureau of Mines that they would be interested in receiving samples for appraisal and possible quotations.

"Both phlogopite and muscovite mica are regarded as 'strategic' war minerals, and have been included among the minerals dealt with in the 'Prospectors' Guide', issued by the Mines and Geology Branch, Department of Mines and Resources, Ottawa, in 1942. Copies of this publication may be obtained by applying to the Director of the Branch.

"In 1940-1941, as a result of curtailment of mica exports from Madagascar, a strong export market developed for Canadian phlogopite—both knife-trimmed block and splittings—and dealers reported a heavier volume of sales than for some years past, with supplies lagging considerably behind orders. Although this situation has brought about a marked revival of interest in mica mining, most of such interest has been shown by small operators lacking the necessary capital for sustained and serious development, and although the number of producers has shown a marked increase, little important new mining has been undertaken, the bulk of the output continuing to come from a few older established mines.

"Although already drawn on extensively, Canadian reserves of amber mica are still adequate to furnish important supplies, and any appreciable advance in price would probably result in a general revival of mining and increased production."

It is interesting to note that in 1941 an important discovery of high quality "large sheet" muscovite was made by Mr. J. Purdy on lot 6, 2nd concession of Mattawan township, district of Nipissing, Ontario; a small initial shipment of the mineral was made in 1941 to a dressing plant at Ottawa.

Table 213.—Production of Mica in Canada, by Provinces, 1931-1941

Year	Quebec		Ontario		Canada	
	Quantity	Value	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$	Tons	\$
1931.....	290	30,601	1,049	23,465	1,339	54,066
1932.....	41	4,076	268	2,752	309	6,828
1933*	256	39,060	666	9,371	944	49,284
1934*	322	85,967	618	9,059	998	97,071
1935.....	373	74,894	255	7,144	628	82,038
1936.....	272	63,123	529	11,433	801	74,556
1937.....	546	124,594	399	9,137	945	133,731
1938*	218	72,982	252	6,445	518	80,989
1939.....	434	122,243	564	22,978	†1,068	147,321
1940.....	437	202,583	458	31,962	†903	237,145
1941.....	802	284,563	793	47,047	†1,743	335,288

* Total for Canada includes 22 tons valued at \$853 produced in British Columbia in 1933, 58 tons valued at \$2,045 in 1934 and 48 tons at \$1,562 in 1938.

† Includes production of mica schist in British Columbia.

Table 214.—Production of Mica in Canada, by Grades, 1940 and 1941

	1940			1941		
	Quantity	Value, f.o.b. shipping point	Price per pound	Quantity	Value, f.o.b. shipping point	Price per pound
	Pounds	\$	\$	Pounds	\$	\$
Rough cobbled.....	142,916	22,801	0.16	169,315	25,977	0.15
Knife-trimmed.....	158,200	80,836	0.51	264,409	144,356	0.55
Thumb-trimmed.....	144,232	17,383	0.12	139,577	19,738	0.14
Splittings.....	170,375	103,624	0.61	184,830	121,879	0.66
Scrap (*).....	1,334,496	12,501	0.009	2,729,760	23,338	0.009
Total.....	1,950,219	237,145		3,487,891	335,288	

(*) Includes ground mica.

The total value of mica produced in Canada from the first official recording of mica statistics in 1886 to the end of 1941 amounted to \$8,414,103 and the greatest annual value was that of \$376,022 for the year 1920.

Table 215.—Consumption of Mica in Canada, by Industries, as Reported to the Annual Census of Industry, 1940 and 1941

	1940		1941	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
In Electrical Apparatus Industry.....		131,774	113	168,769
In Rubber Industry.....	100	10,984	155	15,565
In Roofing (a).....	336	20,816	448	25,975
In Mica Manufacturing Industry.....	199	28,235	134	28,845
Total accounted for.....		191,809		239,154

(a) Includes mica used in manufacture of wall paper.

Table 216.—Principal Statistics of the Mica Mining Industry in Canada, 1940 and 1941

	1940 Canada (*)	Quebec	1941 Ontario	Canada (*)
Number of firms or operators.....	65	63	16	81
Capital employed..... \$	259,168	1,081,313	98,784	1,180,197
Number of employees—On salary.....	8	11	5	16
On wages.....	210	190	40	230
Total.....	218	201	45	246
Salaries and wages—Salaries..... \$	8,567	15,562	7,631	23,193
Wages..... \$	126,138	139,393	19,214	158,607
Total..... \$	134,705	154,955	26,845	181,800
Selling value of products (gross)..... \$	237,145	284,563	47,047	335,288
Cost of fuel and electricity..... \$	9,571	15,117	2,588	17,705
Cost of process supplies used..... \$	18,258	16,700	5,124	21,824
Selling value of products (net)..... \$	209,316	252,746	39,335	295,759

(*) Does not include general statistics for one operating plant in British Columbia in 1940 for which data are not available, also 2 in British Columbia in 1941.

Table 217.—Capital Employed in the Mica Mining Industry in Canada, by Provinces, 1941

	Quebec	Ontario	Canada†
	\$	\$	\$
CAPITAL EMPLOYED AS REPRESENTED BY—			
Present cash value of the land (excluding minerals).....	821,466	32,760	854,226
Present value of buildings, fixtures, machinery, tools and other equipment.....	77,928	31,495	109,423
Inventory value of minerals on hand, ore in process, fuel and miscellaneous supplies on hand.....	21,772	10,687	32,459
Inventory value of finished products on hand.....	24,555	6,780	31,335
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)....	135,592	17,062	152,654
Total.....	1,081,313	98,784	1,180,097

† Data for 1 property in British Columbia not available.

Table 218.—Number of Wage-Earners on Payroll or Time Record on the Last Day of Each Month of Nearest Work Day, 1940 and 1941

Month	1940			1941		
	Mine	Shop (a)		Mine	Shop (a)	
		Male	Female		Male	Female
January.....	68	62	19	91	61	7
February.....	59	57	22	81	67	6
March.....	49	73	21	73	62	24
April.....	58	80	35	80	64	22
May.....	86	72	5	100	74	38
June.....	131	70	5	132	75	50
July.....	158	69	7	135	74	50
August.....	149	58	45	123	68	45
September.....	128	65	41	124	71	38
October.....	112	67	38	110	70	33
November.....	105	67	30	129	69	29
December.....	115	69	27	116	79	35

(a) Includes outside workers.

Vermiculite: Vermiculite, an altered variety of phlogopite or biotite mica, which swells enormously when heated, yielding an exceedingly light-weight and bulky, cork-like material, is now widely utilized in the heat-treated, expanded form as a valuable heat and acoustical insulation product. Most of the world production comes from the United States, and large quantities of the crude mineral are imported into Canada for processing. No authenticated occurrences are known in Canada, though there have been unconfirmed reports of deposits in the Albretha district, British Columbia. The crude material sold in 1941 at \$9.50 to \$12 per ton f.o.b. mines in North Carolina and Montana, respectively, while the expanded product retailed at around \$1 per 24-pound bag of 4 cubic feet at Eastern Canadian points.

THE SALT INDUSTRY

Commercial production of common salt or sodium chloride in Canada during 1941 totalled 560,845 short tons valued at \$3,196,165 compared with 464,714 short tons at \$2,823,269 in 1940. In 1941 salt was produced in Nova Scotia, Ontario, Manitoba and Alberta and of the total Canadian output in 1941 Ontario contributed 477,170 short tons or 92 per cent. Statistics of Canadian salt production represent the recovery of the mineral from brine wells with the exception of Nova Scotia where the output comes entirely from the underground mining of rock salt deposits. The quantity and value of Canadian salt produced in 1941 are the greatest ever recorded.

Of the total salt sold or used by producers in 1941, 258,711 short tons, or 46.1 per cent, was consumed directly by the producers themselves in the manufacture of caustic soda and other chemicals. Sales of salt during 1941 included 78,901 short tons of table and dairy grades; 131,001 short tons of common fine and 35,838 tons of common coarse. The balance of Canadian shipments in 1941 consisted of various other grades, including salt for agriculture and for highway maintenance.

The number of Canadian firms reporting primary salt production in 1941 totalled 9; capital employed by the industry amounted to \$5,559,307, of which \$3,538,827 represented the value of buildings, machinery, etc., and \$261,237 the value of land. Employees numbered 668, including 72 females. Salaries and wages totalled \$1,018,652; \$450,291 were expended for fuel and electricity and \$69,341 for chemicals and other process supplies.

Data relating to imports and exports of salt by countries are available only for confidential use during the continuation of the present war, but the "apparent" consumption of salt in Canada in 1941 was estimated at 629,754 short tons valued at \$3,524,285 compared with 570,876 short tons worth \$3,319,115 in 1940.

Statistics relating to Canadian salt production are available only since 1886 and salt production in the Dominion since that year to the end of 1941 totalled 9,439,546 short tons valued at \$54,070,274. Statistics relating to World production of salt have not been available since 1938.

Table 219.—Production of Salt in Canada, by Grades, 1940 and 1941

	1940			1941		
	Manu- factured	Sold	Value of salt sold (Not in- cluding containers)	Manu- factured	Sold	Value of salt sold (Not in- cluding containers)
	Tons	Tons	\$	Tons	Tons	\$
Table, dairy and pressed blocks.....	73,907	75,166	1,421,832	79,683	78,901	1,372,409
Common, fine.....	93,831	94,817	549,410	133,103	131,001	733,072
Common, coarse.....	24,143	24,259	263,754	36,807	35,838	360,772
Highway salt.....	6,689	6,689	34,264	7,069	7,069	36,986
Land salt.....	673	708	4,528	626	641	4,254
Other grades.....	40,795	39,066	190,509	47,208	48,684	258,019
Brine for chemical works (Salt equivalent sold or used).....	224,009	224,009	358,972	258,711	258,711	430,653
Total	464,047	464,714	2,823,269	563,207	560,845	3,196,165
Value of containers.....			498,981			656,334
Grand Total	464,047	464,714	3,322,250	563,207	560,845	3,852,499

Table 220.—Production of Salt by Provinces*, 1932-1941

Year	Nova Scotia		Ontario		Manitoba		Alberta	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1932.....	31,897	150,708	231,138	1,789,751	508	7,092		
1933.....	34,278	161,889	244,107	1,755,087	1,499	18,388		
1934.....	42,886	191,917	276,751	1,734,196	1,664	20,137		
1935.....	38,701	161,659	320,003	1,698,508	1,538	18,765		
1936.....	38,774	183,915	350,044	1,557,078	2,498	32,151		
1937.....	47,865	216,401	407,701	1,539,599	3,391	43,465		
1938.....	44,950	194,759	388,130	1,657,140	2,920	34,979	4,045	46,035
1939.....	47,885	213,029	370,843	2,200,189	2,453	35,888	3,319	37,526
1940.....	42,495	220,328	412,401	2,371,780	3,076	45,731	6,742	185,430
1941.....	54,007	307,637	477,170	2,512,166	13,051	115,367	16,617	260,995

(*) In addition, Saskatchewan produced 231 tons valued at \$4,510 in 1933, 452 tons at \$8,703 in 1934 and 101 tons at \$2,046 in 1935.

Table 221.—Production of Salt in Canada, 1932-1941

Year	Tons	\$
1932.....	263,543	1,947,551
1933.....	280,115	1,939,874
1934.....	321,753	1,954,953
1935.....	360,343	1,880,978
1936.....	391,316	1,773,144
1937.....	458,957	1,799,465
1938.....	440,045	1,912,913
1939.....	424,500	2,486,632
1940.....	464,714	2,823,269
1941.....	560,845	3,196,165

World production of salt in 1938, the last year for which complete data are available, was computed at 32,000,000 long tons by the Imperial Institute, London. Of this quantity, the British Empire accounted for 5,200,000 long tons or 16.2 per cent. In the order of output, the United Kingdom, India and Canada were the largest Empire producers of the mineral. The leading producers among the foreign countries were the United States, Russia, China, Germany, France, Italy, Poland, Roumania, and Manchoukuo; the total figure for world output included rock salt, brine (wells) salt, and sea salt. In 1937 production in Germany totalled 3,312,128 long tons; in Great Britain 3,083,755 and in France 2,301,151.

Table 222.—Salt Produced for Chemical Purposes*, 1927-1941

Year	Quantity Tons (2,000 lb.)	Per cent of total salt output	Year	Quantity Tons (2,000 lb.)	Per cent of total salt output
1927.....	115,995	43	1935.....	145,433	40
1928.....	135,138	45	1936.....	165,882	42
1929.....	168,327	51	1937.....	205,149	45
1930.....	114,737	42	1938.....	170,938	39
1931.....	97,958	38	1939.....	187,958	44
1932.....	96,242	37	1930.....	224,009	48
1933.....	104,740	37	1941.....	258,711	46
1934.....	124,132	39			

(*) Used in the manufacture of chemicals by producers of salt.

Table 223.—Available Statistics on Consumption of Salt, in Specified Canadian Industries, 1940 and 1941*

Industries	1940		1941	
	Quantity used	Cost at works	Quantity used	Cost at works
	Pounds	\$	Pounds	\$
Fish canning and curing (factories only).....	47,546,400	273,818	44,229,400	363,201
Slaughtering and meat packing.....	94,220,916	588,536	102,888,000	702,348
Acids, alkalies and salts—Brine (salt content) and dry salt.....	415,425,401	541,914	495,346,445	708,321
Soaps and cleaning preparations.....	4,926,412	18,661	5,833,762	24,311
Dyeing, cleaning and laundry work.....	5,070,363	42,354	5,018,198	49,389
Dyeing and finishing of textiles.....	3,162,844	14,181	3,379,482	19,898
Artificial ice.....	457,096	3,245	428,411	3,550
Abrasives—artificial.....	786,000	4,002	826,000	4,280
Waterworks.....	1,000,000	(a)	1,000,000	(a)
Leather tanneries.....	14,301,972	67,025	16,212,371	84,365
Pulp and paper mills.....	25,258,000	96,351	28,772,000	118,015
Stock and poultry foods.....	5,278,000	44,247	6,258,000	46,353
Bread and other bakery products.....	12,744,255	153,264	14,444,719	170,892
Fruit and vegetable preparations.....	9,377,683	70,918	14,476,063	102,009
Biscuits, confectionery, etc.....	1,648,845	16,487	1,609,456	17,685
Foods, breakfast.....	1,165,733	8,630	1,290,819	10,211
Sausage and sausage casings.....	635,106	6,524	766,466	7,996
Ice cream industry.....	1,508,345	8,682	414,880	2,749
Breweries.....	548,811	5,304	721,984	7,530
Malt and malt products.....	228,100	1,257	222,150	1,236
Macaroni, vermicelli, etc.....	109,506	943	74,259	817
Ice cream cones.....	3,959	125	6,006	195
Foods, miscellaneous, including coffee, tea, etc.....	1,868,795	19,774	2,603,422	26,614
Butter and cheese.....		190,729		214,659
Starch and glucose.....	482,783	2,102	492,467	2,302
Animal oils and fats.....	314,000	1,400	270,000	1,200
Condensed milk.....		670		512
Woollen textiles.....				

(*) In addition, large quantities of salt are used on highways.

(a) Value not compiled.

Table 224.—Principal Statistics of the Salt Industry in Canada, 1940-1941

	1940	1941
Number of firms(*).....	9	9
Capital employed..... \$	4,993,914	5,559,307
Number of employees—On salary.....	120	148
On wages.....	466	520
Total.....	586	663
Salaries and wages—Salaries..... \$	299,521	361,661
Wages..... \$	536,985	656,991
Total..... \$	836,506	1,018,652
Selling value of products (gross)..... \$	3,322,250	3,852,499
Cost of purchased process materials..... \$	40,198	69,341
Cost of fuel and electricity..... \$	321,589	450,291
Value of containers..... \$	498,981	655,334
Net value of sales..... \$	2,461,482	2,676,533

(*) 6 in Ontario; 1 in Nova Scotia; 1 in Manitoba; 1 in Alberta.

Table 225.—Capital Employed in the Salt Industry in Canada, 1941

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	261,237
Present value of buildings, fixtures, machinery, tools and other equipment.....	3,538,827
Inventory value of materials on hand, salt in process, fuel and miscellaneous supplies on hand.....	438,218
Inventory value of finished products on hand.....	88,882
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	1,232,143
Total.....	5,559,307

Table 226.—Wage-Earners, by Months, 1940 and 1941 (On 15th or nearest representative date)

Month	1940	1941		
		Male		Female
		Surface	Underground	Surface
January.....	431	372	30	26
February.....	439	368	41	26
March.....	442	379	42	28
April.....	463	404	50	30
May.....	490	440	48	28
June.....	477	465	50	28
July.....	493	480	49	29
August.....	503	480	53	31
September.....	490	476	57	32
October.....	483	485	55	34
November.....	492	476	56	31
December.....	396	470	55	31
Average.....	466	441	49	30

TALC AND SOAPSTONE INDUSTRY

The value of crude and refined talc and soapstone sold by Canadian producers of these minerals in 1941 totalled \$360,809 compared with a corresponding value of \$229,639 in 1940. Mine shipments of soapstone in 1941 valued at \$155,925 came entirely from the eastern townships of the province of Quebec. Production of high grade talc is confined chiefly to the province of Ontario, and in 1941 shipments totalling 18,171 short tons valued at \$204,884 were made from properties located near Madoc, Hastings county, and from a deposit situated in Clarendon township, Frontenac county.

During the year under review, there were 8 firms reported as active in the industry, 5 in Quebec and 3 in Ontario; all of these made commercial shipments. Capital employed totalled \$695,581; employees numbered 148, and salaries and wages distributed amounted to \$128,820. Fuel and purchased electricity used were appraised at \$26,882 and the cost of explosives and other process supplies was reported at \$28,324. The net value of sales in 1941 was estimated at \$305,603 compared with \$192,509 in 1940.

The following information has been abstracted from a report on Talc and Soapstone as prepared for 1941 by the Bureau of Mines, Ottawa:

"Active production of ground talc in Canada was begun in 1906 from deposits in the Madoc area, Ontario, and these deposits have since been the main source of supply. Canada Talc, Limited is the chief producer in the area, having taken over the holdings of G. H. Gillespie Company, the pioneer operator, in 1937. There have been various other small operations in the area. In 1941, Trent Mining Syndicate began to develop a property adjoining that of Canada Talc, Limited, where surface showings indicate an easterly extension of the same vein system, and at the end of the year was proceeding with the erection of a small mill. R. W. Bonter and associates of Trenton ground a small tonnage of slightly off-colour talc in the mill of Canadian Slate Products, a mile and a half north of Madoc; the crude was brought in by truck from a deposit operated by W. C. Spry near Ompah, Frontenac county, 65 miles distant. The talc from Ompah is finely-schistose, cream-coloured, and distinct in character from the white foliated talc of the Madoc district.

"In British Columbia, the deposits near McGillivray, on the Pacific Coast Eastern railway, and at Kapoor, near Victoria, have been idle since 1935. The crude was shipped to a grinding plant at Vancouver, for local roofing use.

"Quebec has been producing soapstone in small quantities since 1922 and the industry has been supplying mainly blocks and bricks for alkali recovery furnaces of domestic kraft mills. Some cut furnace stone has been exported. In recent years the sawing of crayons has been undertaken. Broughton Soapstone and Quarry Company, the principal operator, has developed a large quarry near Leeds station on the Quebec Central railway, in Broughton township. This company produces cut furnace stone and crayons and has a grinding mill in which quarry and sawing waste, as well as a more highly talcose rock occurring in a band cutting its main soapstone body, are pulverized. The company took over the Louis Cyr holdings at St. Pierre de Broughton in 1940. Other operators in the same area are Charles Fortin, of Robertson, and L. C. Pharo, of Thetford Mines. L. C. Pharo installed a small grinding unit on his property in Thetford township in 1938. Some of the dust from these operations is sold to domestic roofing firms, and a considerable tonnage of quarry and sawing waste is shipped to the grinding plant of Pulverized Products, Limited, 4820 Fourth Avenue, Rosemount, Montreal. Baker Mining and Milling Company, 4010 St. Catherine Street West, Montreal, the only other operator in Quebec, has a mine and mill near Highwater in Potton township, Brome county, close to the Vermont boundary.

"World production of talc, including cut soapstone, steatite, and pyrophyllite (a mineral closely resembling talc and used for many similar industrial purposes) amounts to about 500,000 tons a year. The United States produces more than 50 per cent of the total, its output in 1940 being 281,000 short tons. Prior to the war it was followed by Manchuria, with an output of about 100,000 tons a year. France and Italy each produce about 50,000 tons; Norway, 25,000 tons; and British India, 20,000 tons a year. World consumption of talc has increased more than 40 per cent in the past decade.

"Many grades of ground talc are marketed and the price range is wide. Value is dependent upon purity (governing freedom from gritty or iron-bearing substances, slip, and colour), particle shape, and fineness of grinding, the specifications for which vary in the different consuming industries. Roofing and foundry tales are the cheapest grades, these trades being satisfied with coarser grey or off-colour material, often soapstone powder or sawing dust, which sells at about \$5 to \$7 a ton f.o.b. rail. Better-class grey tales, suitable for rubber and paper use, sold in 1941 for \$7 to \$15 a ton f.o.b., according to grade and fineness. White, foliated Madoc talc was quoted at \$18 to \$30 a ton for the two best grades, and \$8 to \$12 for coarser mesh sizes. American tales include high-grade, white Californian material, selling at \$17 to \$20; fibrous New York 'Asbestine', 'Tremoline', and 'Loomite' grades quoted at \$12 to \$15; and the lower-grade, grey Georgia and Vermont products, which sell at \$6 to \$10: all prices f.o.b. mines. Lava steatite and crayon talc sells at from \$100 to \$150 a ton, whereas the coarser roofing grades, often largely talc-coated, gritty, air-separator rejects, may sell as low as \$4.

"**Pyrophyllite.**—Pyrophyllite (hydrous silicate of alumina) closely resembles talc in appearance and physical characteristics. It is difficult to distinguish from talc, even by microscopic means, and often requires chemical analysis for its identification. In the ground state it can be employed for many of the industrial uses of talc. Commercial deposits are relatively scarce. Most of the recorded world production comes from North Carolina, where the industry has expanded rapidly in recent years. A large part of the American output goes to the ceramic trade, the remainder being sold for fillers in various products. When fired, pyrophyllite does not flux, as does talc, and it is of value in a wide range of high grade ceramic products, including refractories. A furnace-patching product made with pyrophyllite is marketed under the name 'Pyroplastic'.

"In 1941, pyrophyllite was quoted at \$8.00 to \$13.00 a ton, f.o.b. North Carolina mills, for 200-mesh and 325-mesh material, respectively."

Table 227.—Production (Sales) in Canada of Talc and Soapstone, 1940 and 1941

	1940		1941	
	Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$
Soapstone (Quebec) (*).....		74,905		155,925
Talc—Ontario.....	15,166	154,734	18,171	204,884
British Columbia.....				
Total Canada.....		229,639		360,809

(*) Shipments often include quantities of material classified as talc.

Table 228.—Production of Talc and Soapstone in Canada, 1934-1941

Year	Value	Year	Value
	\$		\$
1934.....	180,777	1938.....	144,848
1935.....	171,531	1939.....	170,066
1936.....	177,270	1940.....	229,639
1937.....	163,814	1941.....	360,809

Production of talc and soapstone in Canada from 1886 to the end of 1941 totalled 521,801 short tons valued at \$4,817,281. The largest annual tonnage produced during these years was 34,632 in 1941, also, the greatest annual value was \$360,809 in 1941.

Table 229.—Consumption of Talc in Canada, by Industries, as Reported in the Annual Census of Manufactures, 1940 and 1941

Industry	1940		1941	
	Short tons	Cost at works	Short tons	Cost at works
		\$		\$
Rubber industry.....	855	17,587	1,093	21,194
Electrical apparatus.....	222	5,551	438	10,906
Paints.....	2,683	73,490	3,789	130,215
Soaps and cleansing preparations.....	435	10,014	793	21,244
Toilet preparations.....	455	20,024	562	27,377
Polishes.....	17	367	19	478
Products from imported clays.....	511	7,635	762	11,542
Prepared roofing.....	4,822	48,906	4,740	49,750
Pulp and paper.....	1,168	19,364	1,169	19,023

Table 230.—Principal Statistics of the Talc and Soapstone Industry in Canada, 1940-1941

	1940	1941
Number of firms.....	(a) 8	(b) 8
Capital employed..... \$	319,398	695,581
Number of employees—On salary.....	7	8
On wages.....	87	140
Total.....	94	148
Salaries and wages—Salaries..... \$	19,563	21,564
Wages..... \$	61,316	107,256
Total..... \$	80,879	128,820
Selling value of products (Gross)..... \$	229,639	360,809
Cost of fuel and purchased electricity..... \$	15,480	26,882
Cost of explosives and other process supplies..... \$	21,650	28,324
Selling value of products (net)..... \$	192,509	305,603

(a) 6 firms in Quebec and 2 in Ontario.

(b) 5 " " 3 " "

Table 231.—Capital Employed, by Classes *, 1940 and 1941

	1940	1941
	\$	\$
Present value of lands, buildings, fixtures, machinery, tools and other equipment.....	284,993	590,303
Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand.....	5,184	18,343
Inventory value of finished products on hand.....	6,518	8,915
Operating capital.....	22,703	78,020
Total.....	319,398	695,581

(*) By active firms.

Table 232.—Wage-Earners, by Months, 1940-1941

Month	1940	1941		
		Surface	Under-ground	Mill
January.....	51	44	28	27
February.....	53	43	35	30
March.....	50	38	34	28
April.....	47	41	45	35
May.....	72	58	38	35
June.....	74	79	40	31
July.....	83	81	38	30
August.....	80	91	37	33
September.....	110	73	39	41
October.....	148	82	46	42
November.....	147	80	50	39
December.....	138	76	54	37

MISCELLANEOUS "INDUSTRIAL" OR NON-METAL MINING INDUSTRIES

Included in this section are the following non-metallic minerals and mineral products:—

Barite	Grindstones	Peat
Corundum	Kyanite	Silica Brick
Diamonds	Lithium Minerals	Sodium Carbonate
Diatomite	Magnesitic Dolomite	Sodium Sulphate
Fluorspar	Magnesium Sulphate	Strontium Minerals
Garnet	Natural Mineral Waters	Sulphur (Pyrites)
Graphite	Phosphate	

Canadian operators producing certain industrial minerals, and who are usually relatively few in number, have been segregated for statistical purposes into a single group designated as the Miscellaneous Non-Metal Mining Industry. Minerals or primary mineral products produced (or deposits developed) by this industry during 1941 included: barite, diatomite, fluorspar, graphite, grindstones, lithium minerals, magnesitic-dolomite (crude and refined), mineral waters, phosphate, silica brick, sodium carbonate and sodium sulphate. For convenience, the sulphur content of pyrites shipped, sulphur recovered from smelter gas, peat and peat moss are recorded with the various miscellaneous minerals listed above; the value of sulphur production, however, is not included in the total for the miscellaneous non-metallic or industrial minerals as the value of this element is credited to the copper-gold-silver mining and non-ferrous smelting industries.

The number of firms reported as active in the industry during 1941 was 83; capital employed totalled \$3,473,984; employees numbered 1,350 and salaries and wages paid amounted to \$1,364,816. The cost of fuel, purchased electricity and process supplies used during the year was reported at \$815,036 and the gross value of production totalled \$3,089,156 compared with \$2,116,756 in 1940. This represents an increase of 46 per cent and reflects the increased demand for non-metallic minerals utilized in the production of war materials.

BARITE

Canadian production of barite in 1941 totalled 6,890 short tons valued at \$74,416 compared with 338 short tons worth \$4,819 in 1940. Production during the year under review came largely from the recently discovered and developed deposits located at Pembroke, Nova Scotia. Shipments of relatively low grade barite were made from deposits situated near Quyon in the province of Quebec and a relatively small tonnage of the mineral was produced in Range 19, W. 5th M., Township 24, in the Golden Mining Division of British Columbia.

"Barite in 1941", issued by the Bureau of Mines, Ottawa, states:

"The chief development in 1941 was the bringing into production of a large deposit of barite discovered in 1940 near Walton, Hants county, Nova Scotia. The discovery was made in the

course of prospecting operations by Springer—Sturgeon Gold Mines Limited, 67 Yonge Street, Toronto, which company, on the basis of extensive diamond drilling, estimated 1,250,000 tons of ore reserves to a depth of 200 feet. Development of the deposit was started through a subsidiary, Canadian Industrial Minerals Limited, and a 150-ton grinding plant was erected on tidewater, $2\frac{1}{2}$ miles distant. The mill came into operation in June, 1941, and has been turning out a 325-mesh product designed primarily for use in oil-drilling, and for which a ready market exists in Trinidad and South America. Shipments to the end of 1941 totalled 7,940 long tons, or almost double the Canadian production in 1903, the previous peak year. Most of the output was shipped to Trinidad.

"The Walton barite is mostly off-colour material, most of it of a strong reddish shade, but a large tonnage appears to be exceptionally high in barium sulphate, with a specific gravity of $+2.25$ or higher. Such materials is not acceptable for the general ground barite trade, but meets oil-drilling requirements. The company is investigating possible methods of bleaching its product, and also outlets for the crude ore in the lithopone and barium chemicals trades. Estimates by the Canadian Geological Survey, based on a study of the deposit and of drill cores, show about 400,000 short tons of high-grade ore, 300,000 tons of "borderline" ore, and $4\frac{1}{2}$ million cubic feet of low-grade material that would probably need beneficiation to be marketable. Based on these estimates, the Walton deposit is one of the largest known occurrences of barite.

"Mr. M. Gorrie, Flagstone, British Columbia, owner of a small barite deposit 30 miles south of Elko, on the Crow's Nest branch of the Canadian Pacific railway, reported in January, 1942 that he had about 50 tons of ore at the mine ready for shipment. The barite is unusually white and pure, but the deposit is remote from rail and rather difficult of access.

"In 1938, the latest year for which fairly complete statistics are available, world production of barite was 960,700 tons. Germany has long been the leading producer, and supplied 50 per cent of the world total in 1938, followed by the United States, with about 30 per cent. The remainder has been obtained chiefly from the United Kingdom, Italy, Greece, France, and India. Operations recently undertaken in Cuba are expected to make that country of increasing importance as a producer, the Cuban output in 1940 being 16,000 tons.

"Most of the domestic production of barite, which, until 1941 was small, has been custom-ground, chiefly by Pulverized Products Limited, 4820 Fourth Avenue, Rosemount, Montreal. The demand for ground barite was active in 1941, and is likely to be soon increased by the substitution of barite for zinc oxide and lithopone, due to recent priorities in the use of zinc.

"Barite is a relatively low-priced commodity. Using the American trade as an index, market quotations in December, 1941 were as follows: crude ore, \$6 to \$8 per long ton, according to grade, f.o.b. mines; prime white, ground, bleached and floated, \$23 to \$25, f.o.b. Missouri. Canadian quotations were \$7 to \$10 per ton for good white crude, f.o.b. mines, depending on rail-haul; \$40 to \$44 for domestic ground; and \$50 for prime white imported ground.

"Commercial deposits of witherite, the only other ore of barium, are rare, and no occurrences of economic value are known in Canada. Most of the world supply has come from England, but war demands have seriously restricted supplies for American use, and additional sources are being sought on this continent. American imports of witherite in 1940 were 3,500 tons. Interest in witherite (barium carbonate) has been increasing, chiefly for use in the production of barium nitrate, used in priming mixtures for incendiary bombs. It is used in industry chiefly as an addition to heavy clay products and to mortar, in which it combines with soluble sulphates and prevents the formation of the unsightly white efflorescence known as "scumming". It is used also as a carburizing agent in the case-hardening of steel and as a water softener, and in certain kinds of glass.

"The Bureau of Mines at Ottawa, would be glad to receive samples from Canadian sources, of mineral believed to be witherite, together with details of the locality of the occurrence, extent of deposit, etc.

"United States quotations for ground, 90 per cent grade witherite in December, 1941 were \$43 per ton; Canadian quotations were \$55 to \$70."

Production of barite in Canada from 1885 to the close of 1941 totalled 48,578 short tons valued at \$383,484.

Table 233.—Production of Barytes in Canada, 1926-1941

Year	Short tons	\$	Year	Short tons	\$
1926.....	100	2,307	1932.....		
1927.....	56	1,268	1933.....	20	60
1928.....	127	2,847	1939.....	(a)	3,639
1929.....	105	2,341	1940.....	338	4,819
1930.....	66	1,484	1941.....	6,890	74,416
1931.....	16	363			

(a) Not available for publication.

Table 234.—Barite and Blanc Fixe Used by the Canadian Paints, Pigments and Varnishes Industry in Canada, 1931-1941

Year	Barite		Blanc Fixe (*)	
	Pounds	\$	Pounds	\$
1931.....	2,304,119	39,361	146,025	12,915
1932.....	2,064,303	35,138	23,353	817
1933.....	2,062,957	33,678	47,793	1,471
1934.....	2,363,330	44,690	93,918	2,481
1935.....	2,308,628	43,702	141,975	4,223
1936.....	2,533,275	41,687	97,016	3,148
1937.....	2,630,366	42,821	125,743	4,136
1938.....	2,729,212	46,288	116,545	3,287
1939.....	2,884,985	49,659	139,408	4,455
1940.....	3,281,747	71,492	99,422	3,873
1941.....	4,906,829	112,760	169,583	8,010

(*) Artificial barium sulphate.

CORUNDUM

Corundum is found in an area embracing several townships in Renfrew and Hastings counties in the province of Ontario. Corundum mining as an industry made its appearance there in 1900 and production reached a maximum in 1906. Shipments of the mineral in Canada during the period 1900-1921 totalled 19,524 short tons valued at \$2,104,251. No commercial shipments have been reported since 1921. No imports of corundum into Canada were shown in Customs reports for either 1939 or 1940. According to "The Mineral Industry", the entire United States supply of corundum is obtained from imports, mainly from South Africa; imports into the United States in 1940 totalled 2,609 long tons valued at \$165,270. Corundum output in South Africa in 1940 totalled 4,211 tons. It was announced recently that what appears to be a large field of alluvial corundum was discovered in the northeastern Transvaal near Leydsdorp in 1939.

Imports into Canada in 1940 of manufactures of emery or of artificial abrasives, n.o.p., were valued at \$58,472 of which those appraised at \$56,173 came from the United States. Imports of emery in bulk, crushed or ground were valued at \$72,708 in 1940. The chief producers of emery are Greece and Turkey.

Artificial corundum or "fused alumina" (Al_2O_3) is produced from calcined bauxite in steel-lined, water-cooled furnaces of the arc type. Canadian production of crude fused alumina in 1941 totalled 130,881 short tons valued at \$13,665,811 compared with 85,336 pounds worth \$8,249,815 in 1940.

DIAMONDS

Diamonds are not produced in Canada and Canadian consumption is derived entirely from imports which in 1940 were as follows: diamond dust or bort and black diamond for borers, value \$2,708,414; diamonds, unset, value \$1,915,305.

Sydney H. Ball, in a review of the Diamond Industry in 1940 stated:

"The second World War and the Sino-Japanese war blacked out most of Europe and Eastern Asia as purchasers of cut. The trade has left, as its best customers, the United States, Canada, Latin America, the near East and India. Normally Belgium and Holland fashioned 90 per cent

of the world's cut and in a day the industry saw almost its whole processing branch wiped out. A few of the Dutch cutters escaped to England; many Belgian merchants and some cutters, however, escaped. Some merchants eventually reached North America where they are now establishing themselves. The world production of diamonds (gem and industrial) in 1940 was estimated at 14,140,200 carats (2·828 metric tons) worth about \$31,000,000. By weight the Belgian Congo was by far the largest producer (77 per cent) and by value it also led (24 per cent of the total). The British Empire produced 14·2 per cent by weight and 37·1 per cent of the value.

"The United States, Great Britain, Germany, Canada and Russia continue to be the principal consumers of industrial diamonds. In 1940 the demand for industrial stones was strong throughout the year; this was insured by the high rate of industrial activity in the United States due to the armament program and British war orders, to say nothing of Great Britain's own use thereof. Like the United States, Canada produces no diamonds and in both countries it is a critical mineral for national defense."

The number of firms reported as actively engaged in the contract diamond drilling of Canadian mining properties in 1941 totalled 27 compared with 32 in 1940. Operations were conducted in Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia and the Northwest Territories. The income received by the industry from contract drilling operations completed during the year under review amounted to \$3,122,487 as against \$3,021,629 in the preceding year. The number of employees in 1941 was reported at 1,455 and the amount of salaries and wages distributed totalled \$1,535,609. The footage drilled during 1941 in the entire Dominion aggregated 2,793,420 feet, of which 59 per cent was completed in Ontario, 27 per cent in Quebec and 10 per cent in British Columbia.

The industry as a whole purchased, in 1941, borts, ballas, carbons, readysset and cast bits, etc., valued at \$861,253 compared with \$881,085 in 1940. The use of mechanically set bits has increased greatly and it was reported that various bits consisting of very small diamonds or diamond dust bonded by sintered powdered metal were marketed in 1941. More and smaller stones (25-80 per carat) together with improved alloy bonds are now being used in drilling bits.

United States price administrator, Henderson, declared on May 6, 1942, that industrial diamonds, vital in the war effort because of their widespread use in machine tools, or cutting, sharpening, drilling, and marking, are subject to the general maximum United States price regulation, issued April 28.

DIATOMITE

Production of diatomite in Canada during 1941 totalled 344 short tons valued at \$9,935 compared with 248 short tons worth \$7,957 in 1940.

A report on diatomite in 1941, prepared by the Bureau of Mines, Ottawa, states:

"Diatomite consists of the microscopically small remains of siliceous shells of diatoms, a form of algae that at one time lived under water. The material of recent origin, which is the most common in Canada, usually occurs as a grey or brown mud of peat, whereas the Tertiary diatomite is in more or less dry and compact beds, very light in weight and white to cream in colour.

"For many years the International Diatomite Limited, Tatamagouche, Nova Scotia, has been the principal producer but operations in the ponds near New Annan ceased in the fall of 1940 and only a few tons were sold from stock. The 1941 principal producers were G. Wightman, from a deposit on Digby Neck, Nova Scotia and to a lesser extent L. T. Fairey of Vancouver, from Quesnel in the Cariboo district of British Columbia.

"A small amount of prospecting work was carried out on behalf of J. A. Morton of Montreal on deposits near Pecoogan owned by W. M. Campbell of Saint John, New Brunswick. A small amount of prospecting was done in the Gravenhurst area in Muskoka district, north of Toronto, Ontario.

"Prior to the war diatomite was being produced by about thirty countries, but outside the North American continent statistics for the past three years are not available. The United States is by far the world's largest producer followed in order by Denmark, Germany, Japan, Algeria and Northern Ireland. The United States output which is of very high quality, was about 125,000 short tons in 1941.

"No Canadian diatomite was exported in 1941. Although there is a large demand in England for insulation and filler material, the difficulty in shipping, high costs and relatively low price of the English and Irish diatomite prohibit the export of the home product to England. Imports into Canada were about 6,000 tons, almost all from California and a little from Oregon, United States, compared with 4,980 tons valued at \$164,340 in 1940.

"Consumption in Canada was approximately 6,350 tons, a 25 per cent increase over 1940. This was largely due to the increase in the use of diatomite bricks and mortars required for the insulation of the numerous furnaces now in operation in plants making war materials.

"About 75 per cent of the diatomite now being consumed in Canada is in the form of filter-aids, mainly in the refining of cane sugar, 20 per cent is used for insulation, and the remainder is absorbed as a filler, concrete admixture, silver polish bases, and in chemicals.

"Deposits containing medium quality diatomite are very common in some parts of Canada. Owing, however, to United States competition and to the, at present, comparatively small Canadian demand, only properly prepared diatomite of the highest quality can be successfully marketed on a scale sufficiently large to warrant the operation of a property and the erection of a plant.

"Indications are that not more than 25 per cent of the calcined material produced from the best quality Canadian deposit so far discovered, can be made into an efficient filter-aid that can compete with the imported product. Therefore, unless the remaining 75 per cent or more of the non-filter grades produced can be sold, the cost of producing the filter-aid alone would be too high to be commercial. At present, the Canadian consumption of all non-filter grades is less than 800 tons annually, mainly in the form of diatomite insulation bricks, the greatly increased production of which by Canadian firms is necessary before the Canadian diatomite industry can be profitable.

"The present price in Canada varies from \$26.00 to \$75.00 per ton for insulation and filtration; up to \$200.00 in small lots for material suitable for polishes; imported insulation bricks vary from \$85.00 to \$140.00 per 1,000, according to grade and density."

Table 235.—Production of Diatomite in Canada, 1928-1941

Year	Short tons	\$	Year	Short tons	\$
1928.....	368	8,960	1935.....	823	33,140
1929.....	429	10,330	1936.....	615	13,650
1930.....	554	13,247	1937.....	643	18,606
1931.....	1,610	32,789	1938.....	368	13,842
1932.....	1,496	29,506	1939.....	301	10,288
1933.....	1,789	36,648	1940.....	248	7,957
1934.....	1,372	54,910	1941.....	344	9,935

The total Canadian output of diatomite since 1896 when it was first produced in the Dominion, to the end of 1940, totalled 22,620 short tons valued at \$524,590.

Table 236.—Consumption of Infusorial Earth by the Canadian Sugar Refining Industry, 1932-1941

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1932.....	2,577,585	73,309	1937.....	4,586,786	95,532
1933.....	2,537,469	70,191	1938.....	4,908,597	101,473
1934.....	2,562,552	69,116	1939.....	4,819,811	105,711
1935.....	4,307,142	95,566	1940.....	4,984,362	112,369
1936.....	4,375,999	98,954	1941.....	5,343,131	138,973

FLUORSAPAR

Fluorspar production in Canada during 1941 totalled 5,534 short tons valued at \$97,767 compared with 4,454 short tons worth \$59,317 in 1940. Production in these years came principally from deposits located in Hastings county, Ontario; the only other output of the mineral in Canada originated in Nova Scotia where relatively small tonnages were shipped in both 1940 and 1941. A report prepared by the Bureau of Mines, Ottawa, states:

"Production of fluorspar in Canada has been relatively small, and intermittent, the total output from 1905 to the end of 1941 being approximately 60,000 tons, about half of which came from Ontario and the remainder from British Columbia. Most of the fluorspar mined in 1940 and 1941, came from the Madoc area, Hastings county, Ontario. No deposits of importance are known elsewhere in Eastern Canada though there are scattered occurrences in Ontario and Quebec. In Nova Scotia, the mineral occurs in association with veins of barite in the Lake Ainslie district, Cape Breton, where a few hundred tons was produced in 1941. The Rock Candy deposit near Grand Forks, British Columbia, is the largest known occurrence of fluorspar in the Dominion. This mine, owned by the Consolidated Mining and Smelting Co. of Canada Ltd., has been idle since 1929 as sufficient by-product fluorine is now recovered by the Company from the treatment of phosphate rock in the Company's fertilizer plant at Trail. The fluorspar reserves of this mine are probably large.

"World production of fluorspar has averaged about 500,000 short tons annually in recent years. United States and Germany together have supplied about 75 per cent of the total. The remainder has come mainly from France, the United Kingdom, Korea, Italy, Newfoundland, and the Union of South Africa. The United States produced 233,000 short tons in 1940, the highest since 1918 and an increase of close to 30 per cent as compared with 1939. Steps have been taken to increase production in Newfoundland, an important source of supply for the Canadian market. Canada in peacetime used from 12,000 to 15,000 tons of fluorspar a year, about half of it in the steel trade.

"Standard fluxing gravel, or lump grade fluorspar for metallurgical use is usually sold on a specification of 85 per cent CaF_2 , with not over 5 per cent silica. It should not contain more than 15 per cent of fines. American quotations in December 1941 for this grade were \$23.00 per ton, f.o.b. mines, an increase of \$1.00 to \$3.00 a ton over 1940. Canadian (Madoc) fluorspar was reported to have sold in 1941 for \$15.00 to \$23.50 a ton, f.o.b. mines, for grades ranging from 60 to 80 per cent CaF_2 . Glass and enamel grades call for not less than 95 per cent CaF_2 with a maximum of 3 per cent silica and 0.12 per cent iron (Fe_2O_3). The material must be in ground form in various mesh sizes, from coarse to extra fine. American quotations for this grade at the end of 1941 were \$33.60 per ton, in bags, f.o.b. Illinois mines. Acid-grade spar, lump, gravel, and ground, as the strictest specification, minimum 98 per cent CaF_2 , and not over 1 per cent silica. It sold in December, 1941 at \$30.00 f.o.b. mines.

Table 237.—Production of Fluorspar in Canada, 1924-1941

Year	Short tons	\$	Year	Short tons	\$
1924.....	76	1,343	1934.....	150	2,100
1925.....	3,886	19,234	1935.....	75	900
1926-1928.....			1936.....	75	900
1929.....	17,870	268,120	1937.....	150	2,550
1930.....	80	1,240	1938.....	217	3,906
1931.....	40	620	1939.....	240	4,995
1932.....	32	464	1940.....	4,454	59,317
1933.....	73	1,064	1941.....	5,534	97,767

Table 238.—Consumption of Fluorspar in Canada, by Uses, as Reported to the Annual Census of Industry, 1940 and 1941

Industries	1940		1941	
	Quantity	Cost at works	Quantity	Cost at works
	Tons	\$	Tons	\$
Steel furnaces.....	15,307	327,187	17,054	366,701
Chemicals (acids, alkalis and salts).....	8,524	236,924	12,360	394,833
Glass.....	140	6,353	185	7,984
Ferro-alloys.....	111	4,440	539	14,659
Enamelling and glazing.....	16	319	153	6,120
Total accounted for.....	24,098	575,223	30,291	790,297

According to the United States Bureau of Mines, the quantity of fluorspar used by individual plants per ton of basic open-hearth steel produced ranges from 1 to 50 pounds. The steel industry is the chief consumer of fluorspar followed in order by hydrofluoric acid, glass and enamel industries; smaller quantities are used in the production of iron castings, nickel and monel metal, cement, ferro-alloys, etc., also in smelting refractory ores of gold, silver and copper.

GARNETS

In 1941 Canadian production of garnet represented 16 tons of garnet rock valued at \$160 shipped from River Valley, Ontario. This was consigned to Niagara Falls, New York and was used for experimental purposes. In addition to this production, Grenat Canada Limited shipped 60 tons of "Garnet sand blast" valued at \$423. This material was obtained from deposits located in Joly Tp., Labelle Co., Quebec and was prepared for the market in the plant of the company situated at Labelle, Que.

A report on Garnet, prepared by the Bureau of Mines, Ottawa, contained the following information:

"Commercial garnet belongs to a group of complex silicate minerals of which almandine, the brownish-red iron-aluminium silicate is generally considered the hardest and the best as an abrasive. Garnet is a rather common mineral constituent of certain rocks distributed throughout the Dominion and it usually occurs as a garnetiferous-gneiss, large areas of which are known in parts of Ontario and Quebec. At present, however, little garnet is produced in the Dominion.

"Attempts in the past to produce commercial garnet in Canada have failed owing to the small extent to which it is used; to the competition from high quality United States material; and to the fact that garnet possessing abrasive efficiency equal to that obtained in the United States has not as yet been found in sufficient quantities. Consumption in Canada has never been more than 150 tons of graded grain a year, all of which is supplied by the United States.

"Aside from the United States, England is by far the leading consumer of garnet, but the amount used prior to the war was less than 800 tons a year.

"Garnet, crushed and suitably graded as to size, is used for making abrasive-coated papers and cloth, which in turn are used mainly in the wood working (hard woods) and to a lesser extent in the shoe leather industries. As artificial abrasives rather than those made from garnet are used in the surfacing of metals, the marked increase in this work arising from the war effort has not affected activities in the garnet industry to any appreciable extent.

"The specifications for garnet for use in the making of high quality abrasives are somewhat exacting. The individual crystals should be clear and free from embedded impurities and from minute fractures. They should be of deep wine-red colour, and not smaller than pea size, walnut size or larger being preferable. The garnet should be tough, but should yield sharp and angular grains when crushed. The deposit should be extensive and the garnet content should not be less than 25 per cent. It should also be close to rail transportation and industrial centres. Few, if any, of the hundred or more garnet deposits so far examined in Canada fulfil all of these requirements. Minor uses for garnet or garnet rock, are for sand blasting and to a very small extent in the surfacing of plate glass.

"The price in the United States of the best quality concentrate from which grain is prepared for abrasive papers and cloths ranges from \$65 to \$80 a ton f.o.b. mines and of graded grain, \$90 a ton. Some sales of garnet fines for use in the surfacing of plate glass were made at about \$26 a ton delivered, and garnet for use in sand-blasting sold at \$20 to \$30 a ton. Canadian prices of crushed garnet rock for sand blasting were about \$7 a ton."

GRAPHITE

Canadian production of natural graphite in 1941 was valued at \$132,924 compared with \$94,038 in 1940. The output in both years came from the Black Donald mine in Renfrew County, Ontario. No mining operations were conducted at the property in 1941 and production came from the treatment of accumulated tailings. In the province of Quebec, work of an exploratory nature was conducted in 1941 on graphite deposits located in Buckingham Township and in Bouthillier

Township, Labelle County. Graphite shipped from the Black Donald mine is chiefly amorphous in nature, only relatively small quantities of flake grades being produced.

The Bureau of Mines, Ottawa, reviewed graphite in 1941 as follows:

"Graphite is widely distributed in the Archaean rocks of western Quebec and eastern Ontario, in which regions there was formerly a somewhat extensive graphite industry. With the exception of the Black Donald mine, in Ontario, these operations have long been idle and the plants for the most part have been dismantled. The Canadian deposits include bands or lenses of graphitic gneiss; belts of crystalline Grenville limestone carrying disseminated flake; and smaller, but often rich, pockety bodies or veins of coarsely crystalline graphite of plumbago character, usually also in limestone. Near St. John, New Brunswick, bodies of amorphous graphite were worked many years ago on a small scale.

"Black Donald Graphite Company, with mine and mill at Whitefish Lake, 13 miles west of Calabogie, Renfrew County, Ontario, was again the only producer. The company has been in continuous operation for more than 30 years, mining a deposit of exceptional size and richness. The size of flake produced is too small for crucible use, but is well adapted for foundry facings and lubricants, for which purpose most of the output is sold. Most of the material treated in recent years has been rich mill tailings from early operations and discharged into Whitefish Lake, from where they are being recovered by pumping. At the end of 1940 the company started a diamond drilling campaign in a search for new orebodies, as the ore in the old mine workings has been mostly removed, but no important indications of further reserves are reported. Most of the production in the past was used in the American and domestic foundry trade, but the output is now being reserved for Canadian use. A few tons of rich cobbed plumbago were mined in the Buckingham area during 1941 and shipped to the Black Donald Company for treatment.

"Ore reserves at many of the old properties are believed to be considerable and could probably be used to meet domestic needs in an emergency, though this would entail the erection of new mills, or possibly of a central custom mill to treat the ore.

"The Black Donald Company has advised the Bureau of Mines at Ottawa that it might be interested in obtaining supplies of high-grade milling ore from outside sources, and persons in a position to furnish such ore either on a direct-sale or contract basis are advised to submit proposals to the company. Canadian Foundry Supplies and Equipment, Limited, 4295 Richelieu Street, Montreal, will also take shipments of selected natural flake or plumbago-type graphite, provided the material does not require any further beneficiation.

"Artificial graphite is made in Canada by Electro-Metallurgical Company of Canada, at Welland, Ontario, and by the Exolon Company at Thorold, Ontario. These companies supply the United States with part of its requirements.

"World production of natural graphite of all grades, and including flake, crystalline (plumbago) and amorphous, averaged about 140,000 short tons a year during the past decade. Madagascar, Germany, Austria, and Czechoslovakia are the principal producers of flake graphite; Ceylon of crystalline; and Mexico and Korea of the amorphous variety.

"Canadian graphite requirements are principally for the foundry, dry battery, and paint trades. Foundry needs are met in part by domestic (Black Donald) production, and in part by imported Ceylon plumbago. The battery trade uses mainly Mexican amorphous, and paint requirements are filled largely by low-grade amorphous and flake. Owing to the fine grinding required to free the graphite, these Canadian deposits from which production was obtained several years ago yielded relatively little coarse flake of crucible grade, but with modern flotation methods of concentration, these ores could probably be readily treated to yield flake suitable for foundry work, when mesh-size is not important. Supplies of graphite are becoming difficult to obtain and the demand is increasing, and it may thus be necessary to reopen some of the old properties.

"According to American trade journals, prices at the end of 1941 were as follows: Ceylon lump, 10 to 12 cents a pound; carbon lump, 9 to 10 cents; chip, 7 to 8 cents; dust, 4 to 5 cents. Madagascar flake, 9 to 10 cents. All prices ex-dock, New York, duty paid. The spot price of Mexican amorphous rose slightly to \$10.60 a ton, with quotations f.o.b. New York at \$14 to \$25 a ton, according to grade.

"Graphite is classed as an essential mineral by the United States Government, and exports of graphite and graphite products have been subject to special export licence since July 5, 1940."

Table 239.—Mine Production (Sales) of Graphite in Canada, 1931-1941

Year	Short tons	\$	Year	Short tons	\$
1931.....	548	32,149	1937.....	(x)	125,343
1932.....	346	18,483	1938.....	(x)	41,590
1933.....	405	18,367	1939.....	(x)	61,684
1934.....	1,518	71,424	1940.....	(x)	94,038
1935.....	1,782	79,781	1941.....	(x)	132,924
1936.....	(x)	88,812			

(x) Not available for publication.

Table 240.—Consumption of Graphite or Plumbago in Canada, by Industries, as Reported to the Census of Industry, 1940 and 1941

Industry	1940		1941	
	Quantity	Cost at works	Quantity	Cost at works
	Short tons	\$	Short tons	\$
Paints and varnishes.....	69	6,692	85	9,416
Polishes.....	43	4,698	40	4,466
Foundries.....	204	37,300	367	53,406
Acids and salts.....	116	34,044	74	32,345
Prepared foundry facings.....	198	12,836	583	41,516
Total Accounted for.....		95,570		141,149

GRINDSTONES AND PULPSTONES

Production in Canada of natural grindstones and sharpening stones during 1941 totalled 188 short tons valued at \$11,500 compared with 341 short tons worth \$14,543 in 1940. There were no pulpstones produced in either 1941 or 1940. Grindstones produced in 1941 totalled 170 short tons valued at \$8,500 while sharpening stones amounted to 18 tons appraised at \$3,000. The Read Stone Co. Ltd. of Sackville, N.B. was the sole Canadian producer of these stones in 1941 and the sandstone used in their manufacture came from the Stonehaven quarry, Gloucester County, New Brunswick. During 1941 approximately 31 short tons of pebbles were shipped from a gravel pit located at Ceramic, province of Quebec. These were consigned to a gold mine for grinding purposes and were composed chiefly of igneous rocks; this output was classified as quartz production in the 1941 survey of production.

"The large-size Canadian grindstones are used mainly for sharpening pulpmill and tobacco knives; and in the United States in the file, machine-knife, granite tool, and shear manufacturing industries. The small stones are used for scythe and axe grinding. Because of the competition from the artificial grinding wheel and from foreign natural stones, production of grindstones from quarries continues to decline.

"There has been no output of pulpstones since the J. A. and C. H. McDonald Company ceased production four years ago from the sandstone beds on the northwest end of Gabriola Island, near Nanaimo, Vancouver Island, British Columbia.

"Good pulpstones are in demand, particularly for use in the large magazine grinders, but as known Canadian deposits containing thick beds of sandstone of the proper quality appear to have been worked out, production for the present has ceased. There is also an increasing competition from Canadian-made artificial segmental pulpstones mainly of silicon carbide grit and at present about 560 of these stones are in use in the various Canadian pulp mills. The imported natural pulpstones come mainly from West Virginia, United States." (Bureau of Mines, Ottawa).

Table 241.—Production of Grindstones, Pulpstones and Scythestones in Canada, 1931-1941

Year	Tons	\$
1931.....	621	38,103
1932.....	328	15,735
1933.....	498	21,919
1934.....	987	46,478
1935.....	708	34,010
1936.....	569	24,724
1937.....	412	21,429
1938.....	306	16,198
1939.....	304	15,278
1940.....	341	14,543
1941.....	188	11,500

Table 242.—Production of Natural Abrasive Stones, by Kinds, 1941

	Pulpstones		Sharpening stones		Grindstones	
	Tons	\$	Tons	\$	Tons	\$
Nova Scotia.....						
New Brunswick.....			18	3,000	170	8,500
CANADA.....			18	3,000	170	8,500

Table 243.—Consumption of Pulpstones by the Canadian Pulp and Paper Industry, 1931-1941

Year	Number for 2 ft. wood	Value	Number for 2-5 ft. wood	Value	Number for 4 ft. wood	Value
		\$		\$		\$
1931.....	226	72,589	225	71,760	285	337,580
1932.....	210	65,450	139	46,436	222	249,373
1933.....	321	98,475	95	31,945	199	223,635
1934.....	378	103,811	84	29,680	268	292,359
1935.....	417	116,501	52	20,297	237	243,805
1936.....	463	120,227	61	19,478	253	281,265
1937.....	392	123,568	84	21,700	280	382,084
1938.....	306	92,822	37	13,351	186	238,488
1939.....	242	60,622	60	22,443	203	238,620
1940.....	311	96,957	110	49,899	163	257,628
1941.....	295	127,349	77	35,843	97	215,913

The Artificial Abrasives and Abrasive Products Industry

The factory selling value of all products made during 1941 by the manufacturers in Canada of artificial abrasives and artificial abrasive products amounted to \$25,556,330. This value represented a gain of 40 per cent over the total of \$15,324,693 for 1940.

There were 15 firms engaged in manufacturing artificial abrasives and their products during the year, or one less than in 1940; 13 were located in Ontario and 2 in Quebec.

The average number of employees in the industry was 2,075 and payments in salaries and wages totalled \$3,530,751. Expenditures for manufacturing materials amounted to \$7,650,413 and \$1,821,337 was paid out for fuel and electricity. Capital investment in the industry totalled \$9,833,950 of which \$3,815,821 was the value placed on land, buildings and equipment.

Artificial abrasives were made by 4 plants in Ontario and 2 in Quebec. The output of these 6 works was valued at \$20,663,533 and included 130,881 tons of crude fused alumina at \$13,665,811; 32,258 tons of crude silicon carbide at \$3,661,868 and other products and by-products, such as ferrosilicon, firesand, refractory brick, refractory cements, calcium boride, crude boron carbide and boron carbide shapes. An average of 1,548 people were employed and salaries and wages totalled \$2,565,464.

Nine other plants were occupied chiefly in making abrasive products, such as, wheels, paper, pulpstones and sharpening stones; 7 made abrasive wheels and segments, 4 made sharpening stones and files, and 2 made abrasive cloth and paper. The value of all products made in these establishments was \$4,892,797. The number of employees was 527 and payments for salaries and wages amounted to \$965,287.

Table 244.—Products Manufactured, 1940 and 1941

Product	1940		1941	
	Short tons	Selling value at works	Short tons	Selling value at works
		\$		\$
Crude silicon carbide.....	24,562	3,053,047	32,259	3,661,868
Crude fused alumina.....	85,336	8,249,815	130,881	13,665,811
Silicon carbide firesand, etc.....	868	34,649	1,096	30,889
Abrasive wheels and segments.....		1,838,558		3,713,303
Sharpening stones and files.....		116,411		191,757
Ferrosilicon.....	3,354	100,910	10,489	124,383
Other products (*).....		1,931,303		4,168,319
Total.....		15,324,693		25,556,330

(*) Includes abrasive cloth, abrasive paper, tiles, artificial pulpstones, artificial graphite, boron carbide, boron carbide shaps, calcium boride, fused magnesia, refractory cements, firebrick, etc., each of which was reported by one or two companies.

Table 245.—Materials Used in Manufacturing, 1940 and 1941

Material	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Bauxite and pure alumina.....	ton	100,163	2,369,165	151,815	4,010,127
Coal (not for fuel)—					
For fused alumina.....	ton	326	1,992	345	2,182
For silicon carbide.....	ton	4,749	30,961	8,345	60,258
For graphite.....	ton	54	398		
Coke (not for fuel)—					
For fused alumina.....	ton	5,830	34,466	8,859	55,065
For silicon carbide.....	ton	27,202	337,011	32,759	413,275
For graphite.....	ton	407	4,734		
Electrodes.....	ton	1,607	193,715	2,335	286,685
Feldspar.....	ton	68	2,056	84	3,127
Iron borings.....	ton	9,427	108,351	13,550	172,713
Salt.....	ton	393	4,002	413	4,280
Sawdust.....	ton	7,687	21,717	9,129	28,113
Silica sand.....	ton	45,982	221,925	57,362	269,605
Artificial abrasive grains—					
Fused alumina.....	ton	3,085	377,544	5,524	736,569
Silicon carbide.....	ton	1,191	185,135	1,429	263,571
Natural abrasive grains—					
Garnet.....	lb.	254,455	21,780	392,846	38,074
Emery.....	lb.	146,405	10,383	233,765	20,325
Quartz or flint.....	lb.	277,110	5,577	348,167	6,624
Other.....	lb.	79,918	6,639	93,568	9,378
Bonding and bushing materials—					
Clay bonds.....	lb.	1,001,491	29,960	907,697	40,479
Silicate (quantity in equivalent solid form).....	lb.	10,130	362	14,374	623
Elastic mixture.....	lb.	29,887	11,022	30,928	6,489
Bakelite and synthetic resins.....	lb.	112,944	46,013	215,784	76,936
Lead for bushings.....	lb.	53,269	3,035	113,203	6,307
Cotton cloth.....			121,226		172,727
Kraft and rope paper.....			93,338		82,767
Containers and packing material.....			49,551		71,364
All other materials.....			401,923		812,750
Total.....			4,693,981		7,650,413

KYANITE

The following information is from a recent bulletin of the "Imperial Institute", London, (Vol. XXXVI—No. 4). Kyanite, a natural silicate of alumina (Al_2SiO_5 or $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$) is finding a steadily growing market for the preparation of refractories. It is not used in the raw state, but is first fired at $1,450^\circ$ to $1,500^\circ \text{C.}$, and then ground ready to mix with the bond. The product of calcination, however, is known in the trade as "Sillimanite", a misnomer which often leads to

confusion. Sillimanite and andalusite are other natural minerals of exactly the same chemical composition as Kyanite (but different in physical properties), and both are likewise converted on heating into mullite and silica. The conversion of andalusite into mullite is not accompanied by any change in volume and this mineral can therefore be used in the raw state as a refractory. Mullite made from Kyanite is used in the construction of numerous types of furnaces, including electric furnaces and those for the enamelling and glass industries. When added to ceramic compositions containing clay and kaolin, it is claimed to reduce shrinkage, lower the coefficient of expansion, increase breaking strength, resistance to abrasion and electrical resistance, and extend the sintering range. It is also a constituent of certain spark-plug porcelains.

Kyanite is usually a rock-forming mineral, and only rarely does it occur in large monomineralic masses as segregations in quartz-kyanite gneiss or schist. Indian kyanite is the most popular at the present time; the production in India commenced in 1924 and amounted to 24,787 tons in 1936. The mineral also occurs in Nyasaland, British East Africa and Western Australia.

The leading andalusite mine in the world is operated by Champion Sillimanite, Inc., in the White Mountains, California; this Company is a subsidiary of the Champion Spark Plug Co., Detroit, Mich.

None of the minerals, kyanite, sillimanite or andalusite are commercially mined in Canada at the present time and any imports of these minerals into Canada are not shown separately in the Canadian Customs classification. "Metal and Mineral Markets"—New York—June, 1941 quoted kyanite—per ton f.o.b. North Carolina and Georgia \$20.00 to \$32.00—June, 1942—\$22.00 to \$32.00.

LITHIUM MINERALS

Commercial production of Canadian lithium minerals was first recorded in 1937. These were made by the Lithium Corporation of Canada, Limited, from deposits located at Bernie Lake, near Pointe de Bois, Eastern Manitoba. For further details refer to chapter 5.

MAGNESITIC DOLOMITE

Canadian production of magnesitic dolomite in 1941 was valued at \$831,041 compared with \$897,016 in 1940. The 1940 value was surpassed only by that for 1918 when it attained an all-time high annual value of \$1,016,765. Canadian production statistics as shown for 1940 and 1941 represent the total value of mineral sold and used direct as crude unburnt material plus the process or maintenance value of dead-burned used plus the market value of calcined and dead-burned sold as such.

Commercial production of magnesitic dolomite in Canada is at present confined to the county of Argenteuil, province of Quebec. In 1941 continuous operations were carried on at Kilmar, by Canadian Refractories Limited and at Harrington by the International Magnesite Company Limited.

During 1941 a plant was erected by the Aluminum Company of Canada Limited near Wakefield, Que., for the production of brucite concentrates from crystalline limestone. The Bureau of Mines, Ottawa, describes the magnesia obtained from this source as suitable for the manufacture of high-grade basic refractories, magnesium metal, and various chemical compounds.

In 1941 magnesite mined at Marysville, B.C. was shipped to the Trail smelter for use in the experimental production of magnesium by the Consolidated Mining and Smelting Company of Canada Limited; both magnesium ingot and magnesium powder were produced in 1941 from this Canadian magnesite.

In British Columbia prospecting of magnesite deposits located at Williams Lake, in the Quesnel mining district and at Clinton, was conducted by the B.C. Magnesium Company Limited; operations included diamond drilling and open cut work; no shipments of any kind were reported by this company.

Magnesite is available in many countries. Russia is probably the world's greatest producer of magnesite, but almost all is for domestic use. For export, the magnesite is generally shipped in either the calcined or the dead-burned state.

Magnesite is usually calcined before shipment and the resultant magnesia is used for the making of refractory products to withstand extremely high temperatures, for making oxychloride

cement, and for magnesium metal. It is also the basis of a number of magnesium salts and has many minor uses. The world-wide demand for magnesium metal has greatly stimulated interest in deposits of magnesite. Although until three years ago almost all the world's magnesium was made from magnesium chloride brine and from waste water used in treating potash minerals, magnesite is now an important source of this light metal in Europe. Until recently, sea-water and magnesium chloride brine were the sources of all magnesium produced in the United States.

Competing with magnesite as sources of magnesia products are dolomite, brucite, and sea-water. Dolomite, in addition to its newly discovered possibilities for the making of refractories, has long been the principal source of basic magnesium carbonate and pure magnesium oxide, and processes have been worked out for the production of magnesium metal from it. Brucite is being quarried in the United States for the manufacture of refractories. The extraction of magnesia from sea-water has now reached the commercial stage in California and in England, the material so obtained being now marketed in various forms for industrial and pharmaceutical purposes, and for use in refractory products.

Early in 1942 construction on a plant for the production of metallic magnesium was commenced near Renfrew, Ont. by Dominion Magnesium Limited; the raw material or ore to be used will be dolomite and the Pidgeon process (ferrosilicon) will be employed. This plant came into production about midsummer of 1942; calcined brucite rock from the province of Quebec was used by this company during the first period of operation.

Magnesite quotations in United States, May, 1942, were: Per ton f.o.b. California, dead-burned, \$32. Artificial periclose, 94 per cent MgO, \$65; 90 per cent, \$35. Caustic, 95 per cent MgO, no color standard, \$37.50. Washington: Dead-burned grain magnesite, \$22.

Table 246.—Production of Magnesitic Dolomite (Calcined) in Canada, 1930-1941

Year	Tons	Value
		\$
1930.....	13,336	336,162
1931.....	11,411	295,579
1932.....	(a)	262,860
1933.....	(a)	360,128
1934.....	(a)	382,927
1935.....	(a)	486,084
1936.....	(a)	768,742
1937.....	(a)	677,207
1938.....	(a)	†420,261
1939.....	(a)	474,418
1940.....	(a)	897,016
1941.....	(a)	831,041

† Represents value of magnesite (dead-burned, etc.) only, whereas the values for years immediately preceding include the value of some end products containing imported material; for this reason the 1938 to 1941 values are not entirely comparable with those for preceding years.

(a) Not published.

Table 247.—Magnesite and Dolomite Used in the Canadian Primary Iron and Steel Industry, 1931-1941

	Calcined dolomite (b)		Dolomite, crude		Magnesite	
	Short tons	Value	Short tons	Value	Short tons	Value
		\$		\$		\$
1931.....			15,773	76,317	(a)	(a)
1932.....			6,725	32,523	420	14,500
1933.....			6,874	30,557	399	14,798
1934.....			14,748	69,104	2,733	105,072
1935.....			18,394	79,914	3,891	149,987
1936.....			43,552	145,502	6,432	230,656
1937.....			53,066	181,146	8,994	326,091
1938.....			40,540	137,127	9,219	336,811
1939.....	14,858	99,838	40,592	78,904	11,401	351,680
1940.....	21,949	136,360	59,284	123,429	13,673	506,032
1941.....	21,608	160,602	71,087	159,037	18,127	682,742

(a) Information not available.

(b) Included with crude dolomite prior to 1939.

Relatively large quantities of magnesite or magnesium refractories are also used in the smelting of non-ferrous ores but complete data relating to this consumption are not available.

Table 248.—Calcined Magnesite Used by the Artificial Abrasive and Abrasive Products Industry in Canada, 1933-1941

Year	Tons	Value	Year	Tons	Value
		\$			\$
1933.....	(a)	16,430	1938.....		
1934.....	104	6,370	1939.....	121	7,735
1935.....	40	2,448	1940.....	302	19,331
1936.....	418	25,256	1941.....	809	77,508
1937.....	484	29,242			

(a) Information not available.

MAGNESIUM SULPHATE (EPSOM SALTS—NATURAL)

Commercial production of natural magnesium sulphate in Canada during 1941 totalled 265 short tons valued at \$7,343. There was no output of this mineral in 1940. The 1941 production represented shipments of refined "technical" salts made from Ashcroft, B.C., by Ashcroft Salts Limited. Milling operations were conducted by this company from April until the close of the year.

A report prepared by the Bureau of Mines, Ottawa, contains the following information:

"Natural hydrous magnesium sulphate (Epsom Salts or Epsomite) occurs in deposits in lake bottoms or in solution in brine lakes in British Columbia. In Saskatchewan, it is found associated with sodium sulphate. Attempts have been made to produce refined salts, and a number of years ago there was a considerable production from several of the 'lakes' in British Columbia, and experimental shipments were made from one of the lakes in Saskatchewan.

"The largest production has come from the deposits at Basque, British Columbia, the material from which is refined at Ashcroft, 15 miles south of the deposit. The refinery, now owned by Ashcroft Salts Company, Limited, has a capacity of 10 tons of salt a day. It was operated until the early summer of 1939, when it closed down pending improved marketing conditions, and was again brought into production in 1941. The material produced was of high grade; four samples, representative of the different crystal sizes prepared all ran over 99.5 per cent $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$. There are a number of other occurrences in British Columbia, near Clinton, north of Kamloops, and in Kruger's Pass, south of Penticton.

"In Saskatchewan, two lakes south of Wiseton contain brines high in magnesium sulphate, and Muskiki lake, just north of Dana, contains brine high in magnesium and sodium sulphate, which at certain times of the year, crystallizes into a bedded deposit with layers of both salts.

"In the chemical industries, Epsom salt finds many applications. It is employed for tanning and in dyeing, and for textile and medicinal use. Magnesium sulphate is used in the paper industry for weighting paper. In the sole leather industry it is used to obtain a clean shiny cut, and it also helps to retain moisture in the leather and increase its weight. Magnesium salt is used in the dyeing industry only to a small extent. In some cases it is used in the after treatment of leather to increase the fastness of the colour to washing. Magnesium sulphate is used extensively and in large quantities in medicine. It is used for various purposes in the manufacture of textiles. In bleaching wool magnesium sulphate is added to destroy the corrosive effect of sodium peroxide. It is also used for weighting textile fabric, especially silk. Mixed with gypsum and ammonium sulphate, it is used in the manufacture of non-inflammable fabrics.

"Prices for Epsom salts remained steady for the greater part of the year, due to the discontinuance of supplies from European countries, hitherto the main sources of supply. Quotations at the end of the year for the technical grade, as given by Canadian Chemistry and Process Industries for Toronto or Montreal delivery, ranged from \$65.00 to \$70.00 per short ton in bags, whereas the B.P. material in barrels was quoted at from $3\frac{1}{2}$ to $3\frac{3}{4}$ cents per pound."

Table 249.—Production of Natural Magnesium Sulphate in Canada*, 1935-1941

Year	Tons	Value
		\$
1935.....	340	7,965
1936.....	654	13,712
1937.....	727	14,456
1938.....	470	9,400
1939.....	550	9,900
1940.....		
1941.....	265	7,343

(*) Produced entirely in British Columbia.

Table 250.—Magnesium Sulphate Used in Canadian Pharmaceutical Preparations and in Tanning, 1935-1941

Year	Pharmaceutical preparations		Tanning	
	Pounds	Value	Pounds	Value
		\$		\$
1935.....	826,082	22,647	759,744	12,254
1936.....	878,120	23,162	1,115,965	15,120
1937.....	919,825	23,881	992,203	16,165
1938.....	855,547	23,687	1,272,549	14,153
1939.....	830,927	24,091	1,139,670	17,808
1940.....	925,948	31,554	1,646,217	34,242
1941.....	1,043,110	35,389	1,508,824	43,400

MINERAL WATERS

Shipments of natural mineral waters from Canadian springs totalled 181,064 imperial gallons valued at \$72,531 in 1941 compared with 140,663 imperial gallons worth \$20,892 in the preceding year. Production during both years originated in Ontario and Quebec. Some of the more prominent Canadian mineral waters possessing special therapeutic or hygienic properties include the following: in Quebec, the Abenakis springs on the St. François river in Yamaska county; Potton Springs in Brome county and the Coulombia spring at L'Epiphanie. In Ontario, saline, sulphur and gas springs occur at Caledonia Springs and at Carlsbad Springs, near Ottawa; the waters range from alkaline to strongly saline. St. Catharines, near Niagara, is one of the oldest Canadian mineral water resorts and sulphur waters are found at the Preston mineral springs in Waterloo county. The most famous of all Canadian springs is undoubtedly the group of hot sulphur springs at Banff, Alberta. In British Columbia the Harrison Hot Springs in the Fraser Valley and the Halcyon Hot Springs on Arrow Lake are noted for their curative properties.

The total number of firms reporting production of natural mineral waters in the Dominion was 17 in 1941, of which 12 were located in the province of Quebec and 5 in Ontario.

Table 251.—Shipments of Natural Mineral Waters from Canadian Springs, 1931-1941

	Quebec		Ontario		Canada	
	Imp. gal.	\$	Imp. gal.	\$	Imp. gal.	\$
1931.....	19,868	4,746	197,540	8,578	217,408	13,324
1932.....	15,506	4,697	61,208	2,473	76,714	7,170
1933.....	9,024	3,094	29,794	2,347	38,818	5,441
1934.....	75,665	16,116	21,775	1,622	97,440	17,738
1935.....	126,616	15,113	19,900	1,477	146,516	16,590
1936.....	131,186	17,399	23,100	1,117	154,286	18,516
1937.....	198,319	19,697	26,700	889	225,019	20,586
1938.....	159,893	19,033	28,416	2,586	188,309	21,619
1939.....	104,629	17,503	19,140	1,602	123,769	19,105
1940.....	109,025	18,466	31,638	2,426	140,663	20,892
1941.....	144,441	58,062	36,623	14,469	181,064	72,531

Table 252.—Sales of Natural Mineral Waters (*) by the Canadian Aerated Waters Industry, 1930-1941

Years	\$	Years	\$
1930.....	178,348	1936.....	63,687
1931.....	140,730	1937.....	102,648
1932.....	92,066	1938.....	105,872
1933.....	77,125	1939.....	95,531
1934.....	52,113	1940.....	89,013
1935.....	45,100	1941.....	104,364

(*) Whether fortified or not.

PEAT

The statistical survey of the Canadian peat industry for 1941 included both the production of peat as a fuel and as moss. Production of peat fuel in 1941 was confined to the province of Ontario; the output during the year under review came from bogs operated by Lawrence C. Leasa in Ellice Tp., Perth County and by W. J. Stewart at Chesterville, Dundas County. The total Canadian production of peat fuel in 1941 amounted to 355 short tons valued at \$2,155.

Commercial shipments of peat moss in 1941 were reported from bogs operated in the provinces of Quebec, Ontario, Manitoba, Alberta and British Columbia. Canadian production totalled 27,803 short tons valued at \$644,253.

In 1941 official reports received by the Bureau of Statistics, Ottawa, showed 2 Canadian operators producing peat fuel and 20 producing and shipping moss or humus. The industry as a whole provided employment to 677 persons and distributed \$486,116 in salaries and wages. The number of firms reported as active in the working of peat moss bogs were: Quebec, 6; Ontario, 5; Manitoba, 1; Alberta, 1; and British Columbia, 7.

The Bureau of Mines, Ottawa, in a report on peat for 1941, states:

"Peat is a combustible substance produced by the incomplete decomposition of vegetable matter either in water or in the presence of water, under such conditions that atmospheric oxygen is excluded. The character of the peat depends upon the conditions under which it was formed, and on the nature of the vegetation which contributed to its formation. Many species of plants are found in peat bogs, the most abundant being mosses, such as sphagnum and hypnum; marsh and heath plants; grasses, rushes, etc.; marine plants; and sometimes trunks, roots, and leaves of trees. The peat in a bog is named according to the plants that predominate in its formation. Peat is found in every province of the Dominion.

"During recent years peat moss from the bogs at Isle Verte, Rivière Ouelle, and Waterville, Quebec; at Grand Valley, and Clinton, Ontario; at Cowan, Manitoba; at Melfort, Saskatchewan; at Edmonton West, Alberta, and near New Westminster, British Columbia, has been used as litter in bedding for animals; as a soil conditioner for market gardens and horticulture; as filler for fertilizers; as insulating material in the building trade; and as packing material. The production of insulating moss comes chiefly from bogs at Isle Verte and Edmonton West, and there is a small, intermittent production from bogs at Clinton, Ontario, and Melfort, Saskatchewan. The fabricating plants at Isle Verte, Edmonton West, and New Westminster produce a material known as 'Spagmoss', 'Mosstex' and 'Westpeco'. Mosstex is also produced as boards; and Westpeco as pads for the shipment of vegetables. Litter is produced at Isle Verte, Rivière Ouelle, and New Westminster. Humus, used for agriculture and as fertilizer filler, is produced at Alfred, Scarborough Junction, Erie, Brampton, and Grand Valley in Ontario, and at St. Stephen, New Brunswick.

"Prior to the war, the United States obtained most of its requirements of peat moss from Europe, and as these supplies are no longer available, a market has been opened up in that country for at least 72,000 tons of peat moss a year. This outlet is capable of expansion and provides a real opportunity for Canadian producers to increase their sales. Several new deposits were developed in Canada in 1941 for the production of baled peat moss.

"Five new plants, three in Quebec and two in Ontario, each equipped with two mechanically operated presses, were brought into production in 1941. Those in Quebec are: Canada Peat Limited, at Rivière du Loup; La Tourbière Yamaska, at St. Guillaume, D'Upton, Yamaska County; and Premier Peat Moss Corporation, which built a new plant to replace one destroyed by fire at Isle Verte. Those in Ontario are: Erie Peat Company's plant at Welland and the Kennedy Stinson plant at Alfred. The plant of Canadian Humus Products in Beverly township, Wentworth county, Ontario, was producing at capacity throughout the summer of 1941, the product being a limey, humified peat 'Hu-Mar'. No commercial shipments were reported by the company during the year under review.

"Development work was done on several deposits throughout Canada that have been acquired by established companies and by newly formed companies. Included in those acquired are the Caribou bog in Kings county and the Big Plain bog on Chignecto Isthmus in Nova Scotia, and the Jolicure bogs near Midgie, Westmoreland county, the Shippigan and Pokemouche bogs in Gloucester county, and the Eseuminac and Eel River bogs in Northumberland and Kent counties New Brunswick.

"In Quebec, work began on preparing the surface and on draining the St. Anaclet bog one mile south of Father Point, and on the erection of a baling plant.

"In Ontario, Grand Valley Peat Moss Company completed the drainage system of the Luther bog in Dufferin county, acquired the field equipment for transporting sods on the bog and cut and stored twenty stacks of sods in the field. The company is preparing to build a baling plant. Arctic Peat Moss Company was reported to be draining the Fort Frances bog in New Ontario.

"In British Columbia, the large plant in course of construction on the Byrnes bog near New Westminster will supply peat moss for use in the United States in the production of magnesium.

"The Newton bog, north of Cornwall, Ontario, is being developed for the production of dry humus, and the Victoria Road bog, for peat moss and dry humus."

The following excerpts are from an article on "Peat Moss in New Brunswick", by Mr. A. Taylor of the University of New Brunswick. The article appeared in the June, 1942 issue of the Canadian Mining Journal.

"The bog may be composed of either peat, peat moss or an association of both. Of the two, peat is the more dense. Peat moss is the term applied to the living and the undecomposed or unhumidified moss that has grown in the moist districts, and may or may not have fuel peat underlying it. The moss itself is, when dried, brown, light in weight, porous, has no odour, and because of intergrowth does not deteriorate but retains the shape of the original cut. When found in place, it has essentially the same qualities as the dried moss. Depending upon the amount of bacterial decay, the moss, when compressed and humidified, becomes darker in color and attains, when wet, a faint odour. In due course it becomes impregnated with wood remains and other carbonated material and gradually is formed into peat.

"The usefulness of peat moss is symbolized by the following characteristics: 1, high absorptive capacity; 2, permanency of composition; 3, low conductivity of heat, and 4, low ash value. Of these, the first is most outstanding, and because of this feature it is used widely as litter; one ton of peat moss litter lasts as long as two and one-half tons of straw. It makes an excellent substitute for straw and other packing materials. Fresh fruit, vegetables, eggs and other foodstuffs that may become soft, shrivelled or decayed last a much longer time than when packed in present materials. The moss lasts indefinitely and will not transmit any taste or odours to the packed article. Because of the scarcity of magnesium and its value in the war industry, peat moss which is used as a reagent in the extraction of magnesium, is considered highly important in this field. Sphagnum is desirable. It is reported that in the chlorination process for magnesium production, peat moss is added to the mixture so as to give it a porous structure, and thus present a maximum surface to the chlorine gas which is injected. The use of peat moss for this purpose is a very recent and valuable discovery. Peat moss when spread out on light sandy soil causes the moisture to be retained and so makes apparently useless soil available for gardening. It can be placed between floor and roof boards where it not only insulates but also prevents the transmission of noise. As a surgical dressing it serves as an absorbent and deodorizer; it was used extensively in the last war and doubtless will be used in the present war."

PHOSPHATE

Production of phosphate (apatite) in Canada in 1941 totalled 2,487 short tons valued at \$33,376 compared with 358 short tons worth \$4,039 in 1940. Commercial shipments of the mineral during both years were made only from properties located in the Buckingham district of the province of Quebec. Phosphate production in Canada usually represents a by-product in the mining of mica. The Bureau of Mines, Ottawa, reviewed the Canadian phosphate industry in 1941 as follows:

"Phosphate occurs in Canada in two forms, namely, as apatite, found associated with phlogopite mica in irregular pockety bodies in Precambrian crystalline pyroxenite rock of adjacent sections of southwestern Quebec and eastern Ontario, and as bedded, sedimentary phosphate rock of Carboniferous and Permo-Jurassic age that extends along the Rocky Mountains divide, or Alberta-British Columbia boundary, from the Crowsnest area in the south as far north as Jasper.

"The western sedimentary phosphate is rather low-grade and is not considered to be of economic interest under present conditions. Operations by Consolidated Mining and Smelting Company about ten years ago in the Crowsnest-Michel area resulted in the shipment of 5,000 tons of the rock to Trail, British Columbia, for the manufacture of fertilizer, but attempts to concentrate it proved unsuccessful and the company has since drawn its supplies from Garrison, Montana. Eastern Canadian plants requiring phosphate for fertilizer or for other purposes, use mainly Florida rock, which in 1941 cost about \$17.50 per ton, delivered, for 75 per cent grade.

"Large-scale mining of apatite in Ontario and Quebec, an industry of some importance between 1870 and 1894, virtually came to an end in the latter year, following the discovery of the huge deposits of sedimentary phosphate in the Southern States, and production has since been intermittent and small. Total output from the two provinces is estimated at about 350,000 tons. Much of the apatite reported as sold since about 1900 has been by-product material recovered in the mining of mica. It has been clean, cobbled mineral containing about 80 per cent of tricalcium phosphate and most of it has been purchased by Electric Reduction Company, Buckingham, Quebec, for use in the production of elemental phosphorus and various phosphorus products. More recently, Canadian Refractories Limited, Kilmar, Quebec, reported being in the market for small annual tonnages.

"Because of the rather erratic nature of Canadian apatite bodies, the high loss of fines in cobbling clean lump material, and the cost of mining as compared with the low production cost of sedimentary rock, there has been little incentive until recently to attempt to revive the mining of apatite deposits. However, the increase in the laid-down cost of imported phosphate has caused attention to be directed to several of the old mines in the Lièvre River area, Papineau county, Quebec.

"World production of phosphate is about 11 million long tons annually. By far the greater part of it consists of sedimentary rock, but the Russian output of apatite, produced as concentrate from nepheline-apatite rock amounts to about 1,000,000 tons a year. Sweden and Canada are the only other producers of apatite for which figures are available. Sweden produced 6,267 tons in 1939, and as a war measure, was reported in 1940 to be undertaking the recovery of apatite from iron-ore tailings, under Government subsidy. Japan is reported to be considering the development of extensive apatite deposits in French Indo-China; and the Brazilian Government has begun the production of superphosphate from domestic apatite. In the United States, apatite is recovered as a concentrate from the treatment of nelsonite in Virginia, and some by-product mineral has also been produced from magnetite-apatite ore in New York State.

"The United States is the leading producer of sedimentary phosphate, its output in 1940 being more than 4,000,000 tons of which 750,000 tons was exported. Shipments from Tunisia and Morocco in 1939 totalled over 3,600,000 tons; from Egypt and Algeria, about 500,000 tons each; and from the Pacific islands of Nauru, Ocean, and Christmas, a total of close to 1,500,000 tons. Except for Russia, European countries are deficient in phosphate deposits. About 85 per cent of the United States production of phosphate is used in the fertilizer industry."

The largest annual output of phosphate to be recorded in Canada was for 1890 in which year production was reported at 31,753 tons valued at \$361,045. The total production of the mineral in the Dominion from 1870 to the end of 1941 was 345,187 short tons valued at \$4,695,463.

Table 253.—Production of Phosphate in Canada, 1918 and 1929-1941

Year	Short tons	\$	Year	Short tons	\$
1918.....	140	1,200	1935.....	186	1,103
1929.....	1,185	5,380	1936.....	525	4,927
1930.....	40	760	1937.....	100	900
1931.....			1938.....	208	1,886
1932.....	1,316	12,333	1939.....	157	1,712
1933.....	2,214	5,475	1940.....	355	4,039
1934.....	81	685	1941.....	2,487	33,376

Table 254.—Phosphate Rock and Superphosphate Used in the Manufacture of Canadian Fertilizers, 1931-1941

Year	Superphosphate		Phosphate rock	
	Short tons	\$	Short tons	\$
1931.....	51,639	595,789	48,373	395,547
1932.....	36,005	366,462	41,114	316,518
1933.....	59,443	657,123	21,961	164,614
1934.....	73,182	839,980	48,007	396,133
1935.....	86,701	986,674	74,507	610,118
1936.....	97,515	1,103,222	60,924	438,948
1937.....	137,801	1,661,243	101,704	726,572
1938.....	180,243	2,193,699	102,125	765,816
1939.....	174,989	2,026,293	96,319	711,508
1940.....	175,045	2,175,615	143,667	1,262,847
1941.....	143,420	1,719,674	156,038	1,573,165

"Metal and Mineral Markets"—New York—June, 1941—phosphate quotations—were, per long ton, f.o.b. mines: Florida pebble, domestic: 77 to 76 per cent, \$3.65; 75 per cent, \$2.90; 72 per cent, \$2.40; 70 per cent, \$2.15. These same prices were quoted June, 1942.

POTASH

Natural potash salts are not yet mined or recovered on an extensive commercial scale in Canada. Potash occurs in small quantities in rock salt strata at Malagash, Cumberland County, Nova Scotia, and at Gautreau, Westmorland County, New Brunswick. Potassium chloride occurs at Malagash in a number of definite bands in the salt mass in the form of crystalline beds of pink and yellowish green sylvite in the matrix of halite. A 1941 annual report by the Bureau of Mines, Ottawa, refers to the Malagash occurrence as follows:

"In Nova Scotia, Malagash Salt Company produced about 25 per cent less salt than in the previous year. A fire destroyed its power plant early in December, 1940, in consequence of which a complete shut-down of underground development was necessary. A new and permanent power plant has been erected. Definite zones in which indications of potash salts occur have been correlated from the second to the twenty-sixth level and there seems to be an increase in the potash content with depth. The study of these zones is being continued. Detailed studies have been started with a view to improving the grade of fishing salt obtained from this deposit and encouraging results are being obtained."

Complete statistics relating to world production of potash are not available for 1941 as publication of potash production statistics by European Governments virtually ceased in the summer of 1939, and no adequate data are available since.

Table 255.—Potash Salts Used in the Manufacture of Canadian Mixed Fertilizers, 1940 and 1941

	1940		1941	
	Tons	Cost at works	Tons	Cost at works
		\$		\$
Nitrate of potash.....	23	1,338	4	566
Kainite and potash manure salts.....			3,280	59,232
Muriate of potash.....	43,902	1,348,413	42,815	1,540,783
Sulphate of potash.....	5,220	206,809	2,988	134,839

Table 256.—Sales of Potash Salts for Fertilizer Purposes, Other than for the Manufacture of Mixed Fertilizers, Years ended June 30, 1940 and 1941

	1940	1941
	(Short tons)	
Muriate of potash.....	7,808	7,425
Sulphate of potash.....	185	132

No commercial production of bromine or iodine has ever been officially recorded in Canada. The United States Bureau of Mines, Minerals Year Book for 1940 states:

"The United States is the world's largest producer of bromine and, although figures are not available, exports are considerable. Germany and Palestine also are large producers, and appreciable amounts are produced in Japan, France, Tunisia, Italy, Russia and the United Kingdom. Plants for recovering bromine from sea water are reported to be operating in France and in England.

"Fourteen plants reported production of bromine or bromine compounds from natural sources during 1940. The Ethyl-Dow Co. produced the largest quantity, recovering bromine from raw sea water near Willmington, N.C. The second largest producer was the Dow Chemical Co., which recovered bromine from natural brines in Michigan. This Company has also begun to produce bromine at its Freeport (Tex.) plant where magnesium compounds are recovered from raw sea water. The American Potash and Chemical Corporation—a newcomer into the bromine field—also supplied an important quantity of bromine during 1940, having recovered this element from some of the more concentrated process liquors derived from Searles Lake brines. Equipment for producing bromine compounds as well as liquid bromine was being installed early in 1941, and actual output of these compounds was expected to begin by early summer."

PYRITES (Sulphur)

Sulphur production statistics as published by the Bureau of Statistics represent the quantity and value of sulphur contained in iron pyrites shipped plus the quantity and value of sulphur reclaimed for acid manufacture, etc., from smelter fumes. As thus defined, the commercial output of sulphur in Canada during 1941 totalled 260,023 short tons valued at \$1,702,786 compared with 170,630 short tons worth \$1,298,018 in 1940. Production in 1941 comprised 149,129 tons of sulphur in iron pyrites shipped and 110,894 tons recovered from smelter gases. Output by provinces was: Quebec, 146,826 short tons valued at \$575,422; Ontario, 10,057 tons worth \$100,570 and British Columbia, 103,140 tons at \$1,026,794.

Quebec production in 1941 represented the sulphur content of iron pyrites shipped by Noranda Mines Limited and Aldermac Copper Corporation Limited; Ontario output, the sulphur content of sulphuric acid made from gases salvaged from International Nickel Company plants, and in British Columbia the sulphur content of iron pyrites shipped by the Britannia Mining & Smelting Company Limited together with elemental sulphur and sulphur in sulphuric acid made from smelter fumes at Trail by Consolidated Mining & Smelting Company of Canada Limited.

No iron pyrites mines, known as such, have been worked in Canada for several years. The Bureau of Mines, Ottawa, in a report on pyrites and sulphur in 1941 states:

"Although the Freeman process of flash roasting, designed for by-product flotation fines that are obtained from the treatment of copper ore, has opened a prospective market for this class of ore, it is not to be assumed that the mining of pyrites will be stimulated. Ample supplies of pyrites fines are already available at strategic points to meet any Canadian demand.

"There is apparently no standard price in Canada for sulphur in pyrites. Most contracts are believed to be based on a price of 5 cents or better per unit (22.4 pounds) of sulphur per long ton, f.o.b. cars at point of production.

"The United States are the main source of the world production of sulphur. The output in 1941 amounted to 3,150,000 tons, chiefly from the states of Texas and Louisiana.

"Sulphur is used in Canada chiefly in the production of sulphide pulp and for use in the making of artificial silk and newsprint. It is used to a large extent also in the manufacture of

sulphuric acid, explosives, and rubber, and in the production of fertilizers. With the construction of new sulphuric plants in Canada and the United States, the consumption of sulphur was increased in 1941 and will be further increased in 1942."

The following abstracts have been taken from the review on sulphur published in the February, 1942 issue of the *Mining Congress Journal*.

"While sulphur is a vitally essential raw material for war, it is no more so than steel, gasoline, rubber, fertilizers, paper and other countless things which war consumes and sulphur helps to make. The increase in sulphur consumption in the United States from 1940 was about 30 per cent, while industrial activity was 27 per cent.

"Sulphuric acid is still used to concentrate nitric acid, but it is no longer used in large amounts to produce nitric acid. Nearly the same quantity of sulphuric acid as before must, however, pass through the munitions plants to make one ton of explosive, and it then emerges as a large volume of dilute by-product acid. The spent acid disposal problem is being solved by purification and concentration of the acid for use in part by the munition plants and in part for use in other industries.

"The remarkable growth of the rayon industry continues, and of all the rayon processes the viscose process consumes the largest quantity of sulphur. The expansion of the pulp and paper industry has also created increased demand for sulphur.

"Sulphur and sulphuric acid are serving well in the problem of substitute materials. Salt and sulphuric acid are being used for making hydrochloric acid, thus releasing large quantities of chlorine which is used for the same purpose. A number of the proposals for aluminium production from clay involve the solution of the aluminium-bearing mineral in sulphuric acid."

According to Metal and Mineral Markets, New York, the price of sulphur in 1941 remained unchanged at \$16 a long ton, f.o.b. mines. The prices at consumers' plants in Canada vary from \$22 to \$25 according to location, the difference being due to transportation costs.

Table 257.—Production of Sulphur† in Canada, 1932-1941

Year	Tons	\$
1932.....	53,172	470,014
1933.....	57,373	510,299
1934.....	51,537	515,502
1935.....	67,446	634,235
1936.....	122,132	1,033,055
1937.....	130,913	1,154,992
1938.....	112,395	1,044,817
1939.....	211,278	1,668,025
1940.....	170,630	1,298,018
1941.....	260,023	1,702,786

† Sulphur in iron pyrites shipped plus sulphur recovered from non-ferrous smelter gases.

Table 258.—Production in Canada of Pyrites with Sulphur Content, Including Sulphur Contained in Sulphuric Acid, etc., Made from Smelter Gases, 1940 and 1941

	Pyrites (*)			Smelter gas		Total sulphur	
	Sales	Sulphur content		Sulphur content		Tons	Value
	Tons	Tons	Value	Tons	Value		
1940			\$		\$		\$
Quebec.....	124,716	61,728	212,012			61,728	212,012
Ontario.....				18,688	186,880	18,688	186,880
British Columbia.....	3,049	1,507	12,056	(a) 88,707	887,070	90,214	899,126
Canada.....	127,765	63,235	224,068	107,395	1,073,950	170,630	1,298,018
1941							
Quebec.....	298,761	146,826	575,422			146,826	575,422
Ontario.....				10,057	100,570	10,057	100,570
British Columbia.....	4,599	2,303	18,424	(a) 100,837	1,008,370	103,140	1,026,794
Canada.....	303,360	149,129	593,846	110,894	1,108,940	260,023	1,702,786

(*) Recovered from copper ore deposits.

(a) Includes elemental sulphur and sulphur in sulphuric acid and direct ammonium sulphate.

Table 259.—Consumption of Sulphur by Specified Canadian Industries, 1939-1941

Industry	1939		1940		1941	
	Tons	\$	Tons	\$	Tons	\$
Wood-pulp.....	126,818	2,763,657	182,357	4,157,629	201,575	5,062,266
Petroleum refining.....	88	4,161	61	3,110	51	2,649
Acids, alkalis and salts.....	13,894	286,296	22,595	479,875	44,784	1,091,913
Matches.....	84	3,924	67	3,116	65	3,393
Explosives.....	1,865	39,285	1,850	38,390	2,934	58,486
Insecticides.....	1,284	54,735	1,168	41,080	962	35,722
Adhesives.....	66	1,904	71	2,429	82	3,031
Chemicals, miscellaneous.....	3	129	2	121	3	40
Rubber.....	1,269	58,977	1,492	75,219	2,067	106,411
Sugar.....	152	7,379	167	8,494	147	6,877
Fruit and vegetable preparations.....	36	3,131	58	3,668	59	5,206
Other industries (*).....	227	8,687	269	10,107	278	11,603

(*) Starch and glucose, dyeing and finishing of textiles.

SILICA BRICK

The production of silica brick in Canada during 1941 totalled 4,111 M valued at \$238,433 compared with 3,438 M worth \$182,786 in 1940. The manufacture of these refractories was confined, in both years, to the plants of the Dominion Steel and Coal Company, Ltd., at Sydney, Nova Scotia, and the Algoma Steel Corporation, Ltd., Sault Ste. Marie, Ontario. The brick manufactured by both of these companies are processed from crushed silica rock and are utilized in furnace construction and repairs.

Table 260.—Production of Silica Brick in Canada, 1928-1941

Year	M	\$	Year	M	\$
1928.....	3,224	155,502	1935.....	2,461	96,194
1929.....	3,951	173,581	1936.....	2,393	97,285
1930.....	2,418	97,379	1937.....	3,744	181,126
1931.....	900	35,746	1938.....	1,788	109,403
1932.....	93	4,394	1939.....	2,493	124,807
1933.....	636	23,185	1940.....	3,438	182,786
1934.....	2,528	85,945	1941 (†).....	4,111	238,433

(†) Largest annual output and value.

SODIUM CARBONATE (NATURAL)

Production of natural sodium carbonate in Canada during 1941 totalled 186 short tons valued at \$1,488 compared with 220 tons at \$1,760 in 1940. Deposits of this material in the form of "natron" (sodium carbonate with 10 molecules of water) and also as brine, occur in a number of "lakes" throughout the central part of the province of British Columbia, chiefly in the Clinton mining division, around 70 Mile House, and in the neighbourhood of Kamloops. Production in Canada during recent years has come entirely from deposits in British Columbia and in 1940 and 1941 all commercial shipments of primary or mine material were made from 70 Mile and Clasm on the line of the Pacific Great Eastern Railway. The first commercial shipments of natural sodium carbonate from Canadian deposits were recorded for 1921, in which year 197 short tons valued at \$14,775 were reported as sold. The total Canadian production of the material to the end of 1941 amounted to 8,865 short tons valued at \$103,118.

Table 261.—Production of Sodium Carbonate (Natural) in Canada, 1930-1941

Year	Tons	\$	Year	Tons	\$
1930.....	364	4,550	1936.....	192	1,677
1931.....	712	7,351	1937.....	283	2,574
1932.....	495	5,450	1938.....	252	2,268
1933.....	559	5,773	1939.....	300	2,400
1934.....	244	1,920	1940.....	220	1,760
1935.....	242	2,430	1941.....	186	1,488

Table 262.—Consumption of Soda Ash (Sodium Carbonate) in Specified Canadian Industries

Industry	Unit	1940		1941	
			\$		\$
Chemicals and allied products (a).....	pounds	38,721,428	553,507	58,276,976	838,851
Manufactures of non-metallic minerals (b).....	pounds	59,118,000	746,685	88,314,000	1,084,869
Pulp and paper.....	tons	2,817	93,294	3,311	105,855
Textiles (dyeing and finishing).....	pounds	524,359	9,951	479,806	8,992
Sugar refineries.....	pounds	234,087	5,206	225,721	4,924
Dyeing, cleaning and laundry work.....	pounds	840,671	24,438	1,145,101	31,017

(a) Includes acids, salts, explosives, soap, etc.

(b) Includes coke and gas, glass and petroleum refining.

"Canadian Chemistry and Metallurgy"—Toronto—quoted soda ash (June, 1941)—bags of 100 pounds, \$2.00.

"Sodium carbonate, or "soda ash", has many industrial uses, such as in the manufacture of glass and soap, in the purification of oils and of bauxite for the production of aluminium, and in the flotation of minerals. Owing to technical advances, the use of soda ash in the glass industry (the greatest consumer of sodium carbonate) continued to grow. The next largest use of sodium carbonate is in the production of sodium hydroxide or caustic soda. An interesting new use for sodium carbonate is in the manufacture of "synthetic salt cake" (anhydrous sodium sulphate). Considerable quantities of soda ash are also consumed in the smelting of iron ores. The treatment of metallic minerals by flotation in Canada in 1941 required about 4,000 tons of soda ash. As the present known Canadian deposits are far from the main markets, the output is restricted to the requirements of consumers within economic rail haul from the deposits. Eastern consumers of soda ash obtain their supplies from the chemically prepared material made from salt by the Solvay or ammonia process in Ontario and in the United States." (Bureau of Mines, Ottawa).

SODIUM SULPHATE

(Glauber's Salt and Salt Cake)

The production of natural sodium sulphate in 1941 amounted to 115,608 tons valued at \$931,554, compared with 94,260 tons valued at \$829,589 in 1940. Production from the deposits of Western Canada increased over 22 per cent compared with that of 1940. The increase can be traced to the increased activity in the nickel and the pulp and paper industries and to the greater demand for the material in the United States due to the cutting off of imports from Europe. The operating plants in Western Canada are capable of producing over 900 tons of dried salts a day, and if necessary the tonnage could be greatly increased.

The following is from a review of the sodium sulphate industry by the Bureau of Mines, Ottawa:

"The material produced in Canada is both hydrated sodium sulphate known as Glauber's Salt and anhydrous sodium sulphate known to the trade as "salt cake". It occurs as crystals (Glauber's Salt) or in the form of partly saturated or saturated brine in many lakes throughout western Canada.

"Production in 1941 was mainly from Saskatchewan, but a small tonnage of the crude salts was harvested in Alberta for local consumption for cattle licks. The principal producers were: Natural Sodium Products, Limited, with plants at Bishopric and Hardene; Horseshoe Lake Mining Company, Ormiston; Midwest Chemical Company, Palo; and Sybouts Sodium Sulphate Company, Gladmar; all of which are in Saskatchewan. Small tonnages were also produced from several other properties.

"Natural Sodium Products' plant at Bishopric operated throughout the year and has a capacity of about 500 tons daily. The company also acquired the Hockley leases on the deposit at Alsask Lake, formerly operated by Sodium Corporation Limited and has a plant under construction. The Canadian National Railway has completed the construction of a spur track from near Hardene to serve this new plant. Midwest Chemicals Limited, at the central portion of Whiteshore lake, operated throughout the year and the Canadian National Railway constructed a spur track in the autumn of 1941 to serve the company's plant. Horseshoe Lake Mining Company operated its plant at Ormiston.

"Sybouts Sodium Sulphate Company completed its dehydrating plant at Sybouts lake, 9 miles south of Gladmar, Saskatchewan, and started operations early in the autumn. The plant was later destroyed by fire, but plans were made for the building of a new plant which will likely be in operation early in 1942.

"No production is reported from British Columbia. Sodium sulphate is the chief salt in a number of deposits in that province, and several of them have been prospected to determine their extent.

"A discovery made in New Brunswick during 1937 may yet prove of importance as a source of sodium sulphate. New Brunswick Gas and Oilfields, Limited, in drilling for gas at Weldon, has proved large thicknesses of rock salt (sodium chloride). Two holes drilled 3,500 feet apart, from which cores were obtained, show the presence of a bed of glauberite ($\text{Na}_2\text{SO}_4 \cdot \text{CaSO}_4$) from 60 to 100 feet thick, mostly overlying the rock salt; the sodium sulphate content of this bed ranges from 25 per cent to 30 per cent. Glauberite and sodium chloride are present in other holes drilled in 1939, thus further extending the salts basin. Many millions of tons of sodium sulphate seem to be indicated in this deposit, the boundaries of which have not yet been fully determined. The Bureau of Mines, Ottawa, did much research work on the material recovered in these cores, and indicated a method of recovery of the sodium sulphate. Further detailed work is required to determine the commercial possibilities of the deposit.

"Complete figures for the world production of salt cake are not available, and it is difficult to compare the returns from different countries as the production comes from chemical plants and from natural deposits. Germany, prior to the war, was probably the largest producer of total salt cake and Canada was among the first ten producers. Canada is, however, one of the largest producers of salt cake from natural deposits.

"In the chemical industries, glauber's salt is used widely and the demand is increasing. Sodium sulphate is used extensively in the pulp and paper (53,500 tons in 1940) glass, dye, and textile industries and to a smaller extent for medicinal and tanning purposes. It is also used extensively in the nickel-copper smelting industry for the separation of these two metals.

"The price for natural anhydrous sodium sulphate from the deposits in Western Canada ranged from \$8.00 to \$8.50 per short ton f.o.b. plant. The delivered price is considerably higher, owing to the high freight rates to the consuming plants, which are mostly in Eastern Canada."

Table 263.—Production of Natural Sodium Sulphate (*) in Canada, 1930-1941

Year	Short tons	\$	Year	Short tons	\$
1930.....	31,571	293,847	1936.....	75,598	552,631
1931.....	44,957	421,097	1937.....	79,804	617,548
1932.....	22,466	271,736	1938.....	63,009	553,307
1933.....	50,080	485,416	1939.....	71,485	628,151
1934.....	66,821	587,986	1940.....	94,260	829,589
1935.....	44,817	343,764	1941.....	115,608	931,554

(*) All produced in the province of Saskatchewan with the following exceptions—includes production in Alberta, 1937—80 tons, value \$480; 1938—89 tons, value, \$1,127; 1939—10 tons, value \$186; 1940—10 tons, value \$50, and 1941—8 tons, value \$32.

Table 264.—Salt Cake Used in Specified Canadian Industries 1932-1941

Year	Medicinal and pharmaceutical industry		Acids, alkalis† and salts industry		Wood-pulp	
	Tons	Value	Tons	Value	Tons	Value
		\$		\$		\$
1932.....			94	1,811	24,301	489,343
1933.....	39	4,879	9,968	146,201	29,563	580,251
1934.....	51	7,278	26,075	368,576	34,559	655,905
1935.....	59	4,617	22,485	316,734	35,350	642,801
1936.....	27	2,546	7,220	102,176	41,524	711,635
1937.....	29	2,234	8,006	113,054	50,584	894,437
1938.....	21	1,593	3,412	48,486	33,213	588,217
1939.....	24	1,940	11	314	40,685	722,178
1940.....	21	1,820	14	416	53,540	994,875
1941.....	34	3,073	10	326	61,679	1,133,623

† The 1932, 1936, 1937, 1938, 1939, 1940 and 1941 figures do not include sodium sulphate consumed direct in the smelting of nickel-copper ores.

STRONTIUM MINERALS

The following relating to strontium is from a review prepared by the Bureau of Mines, Ottawa:

"Several occurrences of celestite (strontium sulphate) of possible economic interest are known in Canada, and in 1920-21, some ground material produced from a deposit in Bagot township, Ontario, was sold to the paint trade. The material from this deposit is coarsely-fibrous in character and is not very pure, containing about 18 per cent of barium sulphate. It is accordingly not favoured for chemical use, but is regarded as suitable for paints and general filler or loader use. The old pit was pumped out in 1941 and a few tons of ore were sealed down from a small drift. This, along with some stockpile material was shipped to Montreal for grinding. The product was used in the paint trade as a substitute for barite, but is reported to have found little favour, and no further work was done. Celestite of similar character and analysis occurs at some of the old fluorspar mines of the Madoc area in Ontario, and part of it might be recoverable from the waste dumps.

"Celestite, analyzing 98 to 99 per cent strontium sulphate occurs as a small vein of coarse platy crystals in Lansdowne township, Ontario and some of it was mined many years ago. Calcite appears to be the only associated mineral and recovery of a concentrate of high purity should be easily made by jigging and tabling. In the event of a war shortage of imported strontium compounds, this deposit probably offers the best possibility for supplying the deficiency, though the indicated tonnage is small. Celestite similar to this occurs in a small galena prospect shaft in Fitzroy township, in Ontario, analysis of selected material showing 93 per cent strontium sulphate. A moderate supply might be obtained from this source, but the ore would probably need to be concentrated. No important deposits of strontianite (strontium carbonate) are known in Canada.

"World production of strontium minerals is estimated at 5,000 to 7,000 tons a year. England is the principal source of supply, with Germany next. The United States produced about 350 tons in 1940, exclusive of celestite used for oil-drilling. Important deposits are reported to occur in India and Newfoundland, but there has been no production from these sources as yet.

"Celestite is the principal source of strontium used in the manufacture of the various strontium salts, and strontianite a less common mineral, is used for the same purpose. The nitrate, carbonate, and hydrate are the most important of the strontium compounds used in industry and medicine. Strontium nitrate is employed mainly in pyrotechnics, for fireworks, railroad signal flares, and military flares and rockets, to which it imparts the characteristic strong red flame colour of the element. Other strontium compounds are employed in tracer bullets and shells. The hydrate is used chiefly in the refining of beet sugar by the Schiebler process. In North America, however, sugar is refined mainly by the Steffens, or lime, process. The carbonate is reported to be used to some extent as a batch ingredient in the manufacture of certain kinds of glass, glazes, and enamels, and as a fluxing and desulphurizing and dephosphorizing agent in iron and steel. Strontium chloride powder finds limited use in refrigerators working on the solid absorption principle. Ground celestite is used in fairly large quantities for purifying caustic soda in the rayon industry, and some impure material has been ground and employed as a barite substitute for weighting oil-drilling muds. Interest has also been shown in the possibilities of the carbonate and the sulphate in glass and white wares.

"Strontium metal, made from either the natural sulphate or carbonate, is used in limited quantities in certain alloys, mainly of copper, tin, lead, zinc, and cadmium.

"As yet, there is no serious shortage of strontium minerals in North America and supplies of ore from Great Britain are available. The United States small production was supplemented by imports amounting in 1940 to 2,750 tons, valued at \$28,686, most of it from England. Early in 1941 it commenced to import from a new source in Mexico.

"Trade in strontium minerals is mainly confined to a few importer-dealers, with sales based on individual contract. Price quotations in American trade journals in December 1941 for powdered celestite, 92 per cent grade, remained unchanged at \$45 a ton; crude domestic ore sold at \$15 to \$20 a ton f.o.b. mines. Crude lump strontianite, 84 to 86 per cent grade, was quoted at \$55 a ton, while the manufactured carbonate of 90 per cent purity sold at 15 to 18 cents a pound. Strontium nitrate, one of the chief commercial salts, remained at about 8 cents a pound."

In 1941, 27 tons of celestite valued at \$280 were shipped from a property in Renfrew county, Ontario. The mineral was obtained by a A. E. Fletcher from old dumps and surface openings located on lots 6 and 7, concession 10 Bagot township.

VOLCANIC DUST

There has been no Canadian production of volcanic dust since 1934. In that year, 31 tons valued at \$620 was shipped chiefly from deposits located at Williams Lake, B.C. The following is abstracted from a report prepared by the Bureau of Mines, Ottawa:

"Deposits of volcanic dust (pumice dust) are found in Saskatchewan, Alberta, and British Columbia. There has been intermittent production from Waldeck, near Swift Current, Saskatchewan, and from near Williams Lake in British Columbia.

"In Saskatchewan, deposits occur also five miles north of Braddock; west of Beverley; and near St. Victor, all of which are grey to buff in colour. Some stripping and prospecting was done during 1940 on a deposit of white volcanic dust overlain by bentonite 5 miles west of Rockglen, and laboratory experiments were carried out during 1940-41 by the University of Saskatchewan on the Rockglen and several of the other deposits of volcanic dust.

"In British Columbia there are several deposits, of which the purest known is a snow-white, fine-grained volcanic dust from the Deadman river, north of Kamloops lake. Extensive beds of compact dust also occur north of Quesnel lake in the Cariboo district but there has been no production.

"The material is used mainly as the abrasive base in scouring and cleansing compounds, and a small amount is used in acoustic plaster and in concrete admixture. About 60 per cent of the United States output is used for cleansing and scouring compounds; 27 per cent for light-weight concrete and aggregate; 4 per cent for acoustic plaster; and the remainder for asphalt filler, stucco, filtering and insulating media, paint filler, insecticide, floor sweep, dusting the inside of tires, and in abrasive uses, such as glass bevelling, or in the polishing of aluminium. Some of the United States volcanic dust produced in the United States in 1939 was used in the manufacture of fireproof walls, building tiles and slabs, and in the refining of petroleum. The use of volcanic dust as a ceramic raw material has not been extensive in the United States, although its suitability for such use has been indicated by laboratory and industrial applications. In this connection it has been used successfully in some glazes, replacing feldspar."

United States quotations for pumice stone, March, 1942, were: per pound f.o.b. New York or Chicago, in barrels, powdered, $2\frac{1}{2}$ cents to $4\frac{1}{2}$ cents; lump 5 to $7\frac{1}{2}$ cents.

Table 265.—Production of Miscellaneous Non-Metallic Minerals in Canada, 1940 and 1941

Item	Unit of measure	1940		1941	
		Quantity	Value	Quantity	Value
			\$		\$
Barytes.....	Ton	338	4,819	6,890	74,416
Diatomite.....	Ton	248	7,957	344	9,935
Fluorspar.....	Ton	4,454	59,317	5,534	97,767
Garnets.....	Ton			16	160
Graphite.....			94,038		132,924
Grindstones (b).....	Ton	341	14,543	188	11,500
Lithium minerals.....					
Magnesium sulphate.....	Ton			265	7,343
Magnesitic-dolomite.....			897,016		831,041
Mineral waters.....	Imp. gal.	140,663	20,892	181,064	72,531
Peat for fuel.....	Ton			355	2,155
Peat moss.....	Ton	(incomplete)		27,803	644,253
Phosphate (a).....	Ton	358	4,039	2,487	33,376
Silica brick.....	M	3,438	182,785	4,111	238,433
Sodium carbonate.....	Ton	220	1,760	186	1,488
Sodium sulphate.....	Ton	94,260	829,589	115,608	931,554
Strontium minerals.....	Ton			27	280
Total (Gross).....			2,116,755		3,689,156
Sulphur production.....	Ton	170,630	1,298,018	260,023	1,703,786

(a) Represents apatite mined in Quebec, usually a by-product in mica production.

(b) Includes pulpstones, etc.

(c) Includes sulphur content of pyrites at its sales value and estimated figures for quantity and value of sulphur in smelter gases used for acid making or recovered as elemental sulphur, or in ammonium sulphate (direct). General statistics relating to production of sulphur included with those of the copper-gold mining and non-ferrous smelting industries.

Table 266.—Principal Statistics Relating to Miscellaneous Non-Metal Mining Industries in Canada, 1940 and 1941

	1940	1941
Number of plants.....	46	83
Capital employed..... \$	2,491,527	3,473,984
Number of employees—On salary.....	67	119
On wages..... \$	480	1,231
Total.....	547	1,350
Salaries and wages—Salaries..... \$	169,102	247,213
Wages..... \$	534,399	1,117,603
Total..... \$	703,501	1,364,816
Selling value of products (gross)..... \$	2,116,756	3,089,156
Cost of fuel and electricity..... \$	402,969	499,370
Cost of process supplies used..... \$	205,059	315,666
Selling value of products (net)..... \$	1,467,363	2,274,120

Table 267.—Capital Employed in the Miscellaneous Non-Metal Mining Industries in Canada, 1941

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	
Present cash value of the land (excluding minerals).....	261,294
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,303,748
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	222,939
Inventory value of finished products on hand.....	128,431
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	732,418
Total.....	2,648,830

Table 268.—Wage-Earners, by Months, in the Miscellaneous Non-Metal Mining Industries in Canada, 1939-1941

Month	1939	1940	1941		
			Surface	Under-ground	Mill
January.....	216	352	414	65	259
February.....	238	352	417	58	251
March.....	248	392	455	66	221
April.....	270	359	578	54	278
May.....	425	482	862	52	317
June.....	485	472	1,532	64	329
July.....	451	548	1,352	74	253
August.....	474	517	1,270	86	286
September.....	453	604	924	89	304
October.....	483	614	1,038	85	335
November.....	481	581	741	74	348
December.....	473	451	705	62	351
Average.....	397	480	865	71	295

CHAPTER NINE

CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS

Including Cement, Clay and Clay Products (Brick, Drain Tile, Kaolin, Sewer Pipe, Structural Tile, Stoneware and Pottery made from Domestic Clays, Fireclay, Firebrick, Fireclay Blocks and Shapes, Imported-Clay Products), Lime, Sand and Gravel, Sand-Lime Brick, and Stone, including Slate.

Grouped in this chapter are those industries producing structural materials from non-metallic minerals, rocks and clays of Canadian origin. These industries include those firms engaged in the production of Clay Products, Portland Cement, Lime, Sand, Gravel and Stone. The output of these materials attained an all-time high value of \$58,534,834 in 1929; however, the output of structural materials suffered severe annual declines throughout the depression period of the early 1930's. The construction of defence works, such as airports, military camps, temporary office buildings, and other war-time projects since 1939 has resulted in a very pronounced expansion in the output of structural materials. In 1941 the combined value of these products totalled \$45,373,272 as compared with \$43,703,949 in 1940 and \$33,878,666 in 1938.

There has been an increasing consumption of stone and lime for other than building purposes. This has been particularly evident in recent years and is the result of expansion in certain industries where these materials are utilized in various chemical processes. Shipments of stone and lime for these purposes are classified, for convenience, with data relating to production of these same materials for structural purposes. However, statistics pertaining to their consumption for industrial purposes are segregated in the following tables.

Table 269.—Changes in Type of Construction in Canada during 1939-1941

(Construction Branch D.B.S.)

Type of construction	1941 compared with 1939	1941 compared with 1940
	\$	\$
Total Value of Construction.....	+266,546,944	+165,627,846
Building Construction.....	+215,450,093	+116,690,613
Residential.....	+33,659,911	+27,661,143
Institutional.....	- 6,039,851	- 2,033,955
Commercial.....	+ 6,057,025	+ 591,375
Industrial (includes factories, warehouses, mine buildings, etc.).....	+141,043,440	+ 97,074,167
Other (includes armouries, barracks, hangars, etc.).....	+ 40,729,568	- 5,419,367
Engineering, Harbours, Rivers, etc.....	+ 32,353,099	+ 35,824,493
Streets, highways, etc.....	- 18,307,865	+ 7,890,150
Bridges, watermains, sewers, dams, reservoirs, etc.....	+ 14,907,978	+ 17,397,092
Electric stations and transmission lines.....	+ 9,569,846	+ 3,372,029
Docks, wharves, piers, etc.....	- 2,756,386	+ 1,666,801
Other engineering (includes landing fields, parks, canals, dredging, pile driving, etc.).....	+ 28,939,523	+ 5,498,321
Building Trades.....	+ 18,743,752	+ 13,112,740
	+ Increase	- Decrease

General and trade contractors and subcontractors were responsible for \$563,977,540 or 88.2 per cent of the value of work reported. Provincial Government Departments for \$34,848,840, Municipalities, \$21,494,113, Dominion Government Departments, \$17,969,639 and the Harbours Board, \$1,460,472.

From the figures published in this report, it is impossible to get the total value of public construction, as general and trade contractors and subcontractors do not give a breakdown of their operations into public and private construction.

Table 270.—Value of Construction Contracts Awarded, by Provinces, 1936-1941

(Maclean Building Reports Ltd.)

Provinces	1936	1937	1938	1939	1940	1941
	\$	\$	\$	\$	\$	\$
Maritime.....	17,908,800	21,557,200	19,522,800	16,146,300	21,142,100	36,736,400
Quebec.....	45,749,500	71,940,800	65,778,900	62,846,600	96,326,300	154,541,200
Ontario.....	72,393,300	97,777,400	73,070,100	82,605,500	146,806,100	145,598,600
Manitoba.....	6,994,400	7,945,100	6,115,200	5,374,400	28,003,700	11,701,600
Saskatchewan.....	2,200,600	6,704,900	3,969,000	3,246,100	12,566,700	11,068,700
Alberta.....	6,297,400	4,901,000	8,180,000	5,234,900	23,940,100	15,598,800
British Columbia.....	11,044,000	13,230,300	10,641,900	11,724,700	17,224,800	18,716,000
Canada.....	162,588,000	224,656,700	187,277,900	187,178,500	346,009,800	393,991,300

Table 271.—Total Value of Work Performed in Canada by General and Trade Contractors (including Subcontractors), Municipalities, Harbour Commissions, Provincial and Dominion Government Departments, 1937 to 1941

(Construction Branch, Dominion Bureau of Statistics)

	\$
1937.....	351,874,114
1938.....	353,223,285
1939.....	373,203,680
1940.....	474,122,778
1941.....	639,750,624

Table 272.—Value of Clay Products and Other Structural Materials Produced in Canada, by Provinces, 1936-1941

Province	1936	1937	1938	1939	1940†	1941
	\$	\$	\$	\$	\$	\$
Prince Edward Island.....	*27,663					
Nova Scotia.....	1,763,516	2,293,325	1,611,111	1,829,207	1,855,771	1,330,888
New Brunswick.....	931,827	1,128,931	2,188,889	1,911,041	936,161	1,145,412
Quebec.....	7,503,022	10,350,583	11,619,514	12,319,773	15,001,749	16,631,657
Ontario.....	10,326,967	15,121,178	11,997,177	12,856,694	16,636,844	18,652,990
Manitoba.....	1,666,789	1,673,124	1,805,875	1,646,797	2,600,304	2,197,095
Saskatchewan.....	380,115	585,673	781,224	556,973	906,181	631,732
Alberta.....	1,245,549	1,303,533	1,627,462	1,947,453	2,971,550	2,626,277
British Columbia.....	1,925,293	2,413,352	2,247,414	2,314,821	2,795,389	3,416,996
Canada—Gross value.....	25,770,741	34,869,699	33,878,666	35,382,759	43,793,949	46,633,056
Net value.....	21,052,574	28,868,159	23,446,299	29,628,817	34,893,571	35,865,916

* Sand and gravel.

† Includes value of cement containers for 1940 and 1941.

NOTE: For statistics relating to employment etc., in these combined industries see totals in Table 21, chapter 1.

CEMENT INDUSTRY

Producers' sales of cement in 1941 as reported by the Canadian cement industry totalled 8,368,711 barrels valued at \$13,063,588, compared with 7,559,648 barrels worth \$11,775,345 in 1940. The output in 1941 was the largest attained since 1931 when production totalled 10,161,658 barrels valued at \$15,826,243. Of the 1941 sales, 4,048,749 barrels were produced in Quebec plants; 2,748,854 barrels in Ontario; 576,648 barrels in Manitoba; 492,515 barrels in Alberta and 501,945 barrels in British Columbia. The high and low prices per barrel in 1941 were \$2.70 and \$1.25.

The number of firms reporting commercial production of Portland cement in Canada during 1941 was 3 and the plants in operation numbered 8. Capital employed totalled \$51,108,294 and the industry distributed \$1,860,931 in salaries and wages to 1,235 employees. The total value of fuel and electricity used during the year under review amounted to \$2,897,383, of which \$2,104,277 were expended for coal and \$748,631 for electricity. Process supplies consumed, including

chemicals, explosives, etc., were valued at \$887,041 and in addition the following tonnages of primary materials of mineral origin were used in the manufacture of the final product: limestone, 2,086,781; clay, 185,954; gypsum, 49,031; shale, 26,837; sand, 16,110 and iron oxides 614. Data relating to imports and exports of cement are being withheld from publication until the termination of the war.

Erection of new plants and office buildings for war-time service, together with the construction of air training centres and other military projects, has greatly stimulated the production of Portland cement in Canada. A report on cement, prepared by the Bureau of Mines, Ottawa, contains the following information:

"Portland cement, the principal raw materials for which are limestone and clay, is manufactured in five provinces of Canada. In addition to the standard or ordinary variety of Portland cement, several other varieties, including high-early-strength, alkali-resistant, and white cement are now made in this country, the last named variety, however, being made from imported clinker.

"Canada Cement Company, Limited, operates plants at Hull and Montreal East in Quebec; at Port Colborne and Belleville in Ontario; at Fort Whyte, Manitoba; and at Exshaw, Alberta. St. Mary's Cement Company, Limited, operates a plant at St. Mary's, Ontario. Medusa Products Company of Canada, Limited, has a plant at Paris, Ontario, making white cement, cement paints, etc., from imported clinker. British Columbia Cement Company operates at Bamberton, British Columbia. The total rated daily-capacity of all plants at present is about 35,000 barrels, (a barrel of cement weighs 350 pounds net), but this will be increased in 1942 when equipment now being installed is in operation.

"When the change over from the "dry" to the "wet" process, now under way at the Exshaw plant of Canada Cement Company, is completed, all Canadian plants making cement from domestic raw materials will be using the wet process. Remarkable uniformity in the chemical and physical properties of the standard variety of cement is achieved throughout the country as the result of close technical control and improvements in plant equipment.

"A new 325-foot kiln is being installed at the Montreal East plant of Canada Cement Company. A new pack house with a dust-collecting system, and storage silos having a capacity of 350,000 barrels of finished cement were built in 1941 at the Hull plant of this company.

"Froth flotation is now used in a number of plants in the United States and other countries to remove certain materials, principally excess silica and mica, from limestone. The successful adaptation of this process to the beneficiation of cement raw materials has permitted the utilization of limestone deposits, which, though advantageously situated are not sufficiently pure in their natural state for cement manufacture."

Complete data relating to world production of Portland cement have not been available since 1938; total world production in that year was estimated at 84,000,000 metric tons.

Table 273.—Summary Statistics of Cement Production, Sales, etc., in Canada, 1940 and 1941

	1940		1941	
	Barrels (*)	Value	Barrels (*)	Value
		\$		\$
Output.....	6,947,577		8,430,987	
Sold or used.....	7,559,648	11,775,345	8,368,711	13,063,583
Stocks on hand December 31.....	1,253,400		1,365,676	
Apparent Consumption.....	7,272,886		8,069,824	

(*) 1 barrel=350 pounds.

Table 274.—Production and Apparent Consumption of Cement in Canada, 1929-1941

Year	Sold or used		Apparent consumption
	Barrels	\$	Barrels
1929.....	12,284,081	19,337,235	12,105,950
1930.....	11,032,538	17,713,067	10,877,238
1931.....	10,161,653	15,826,243	10,085,986
1932.....	4,498,721	6,930,721	4,466,738
1933.....	3,007,432	4,536,935	2,974,020
1934.....	3,783,226	5,667,946	3,727,521
1935.....	3,648,086	5,580,043	3,610,217
1936.....	4,508,718	6,908,192	4,479,656
1937.....	6,168,971	9,095,867	6,157,485
1938.....	5,519,102	8,241,350	5,478,180
1939.....	5,731,264	8,511,211	5,591,328
1940.....	7,559,648	11,775,345	7,272,886
1941.....	8,368,711	13,063,588	8,069,824

Table 275.—Producers' Sales of Cement in Canada, by Provinces, 1939-1941

Province	1939		1940		1941	
	Barrels	Value	Barrels	Value	Barrels	Value
		\$		\$		\$
Quebec.....	3,027,759	4,035,294	3,854,339	5,432,105	4,043,749	5,798,188
Ontario.....	1,709,263	2,437,777	2,355,352	3,518,247	2,748,854	4,019,656
Manitoba.....	343,717	773,363	572,408	1,287,918	576,648	1,274,392
Alberta.....	377,846	744,357	414,183	832,508	492,515	985,030
British Columbia.....	272,679	520,420	363,360	704,567	501,945	986,322
Canada.....	5,731,264	8,511,211	7,559,648	11,775,345	8,368,711	13,063,588

Table 276.—Kilns Used by Canadian Cement Industry, 1932-1941

Year	Total daily capacity	
	Number	Barrels
1932.....	47	43,822
1933.....	41	43,622
1934.....	41	43,922
1935.....	20	32,650
1936.....	19	33,000
1937.....	18	33,900
1938.....	(a) 21	35,200
1939.....	(b) 21	35,000
1940.....	(c) 21	35,000
1941.....	(d) 20	33,050

(a) 10 in use with a daily capacity of 23,100 barrels.

(b) 11 in use, capacity 23,700 barrels per day.

(c) 13 in use, capacity 27,950 barrels per day.

(d) 16 in use, capacity 30,350 barrels per day.

Table 277.—Specified Materials Used in Canadian Cement Plants, 1932-1941

Year	Shale	Limestone	Gypsum	Sand	Clay	Iron Oxides
	Tons	Tons	Tons	Tons	Tons	Tons
1932.....	(x)	1,141,376	27,538	(x)	(x)	(x)
1933.....	(x)	616,364	13,319	(x)	(x)	(x)
1934.....	(x)	806,546	19,172	(x)	(x)	(x)
1935.....	(x)	818,443	21,611	5,047	(x)	(x)
1936.....	(x)	1,180,358	25,447	8,549	94,943	(x)
1937.....	(x)	1,465,168	33,691	9,281	195,877	444
1938.....	13,821	1,344,868	51,975	9,465	143,421	22
1939.....	27,241	1,379,858	31,492	7,942	105,982	16
1940.....	18,347	1,765,944	38,903	15,298	144,152	170
1941.....	20,837	2,086,781	49,031	16,110	185,954	614

(x) Data not recorded.

Table 278.—Principal Statistics of the Cement Manufacturing Industry in Canada, 1939-1941

	1939	1940	1941
Number of firms.....	3	3	3
Number of plants.....	8	8	8
Capital employed.....	\$ 51,251,358	50,370,276	51,108,294
Number of employees—On salary.....	91	83	87
On wages.....	910	969	1,148
Total.....	1,001	1,052	1,235
Salaries and wages—Salaries.....	\$ 198,141	191,548	190,771
Wages.....	\$ 1,099,401	1,324,218	1,670,160
Total.....	\$ 1,297,542	1,515,766	1,860,931
Selling value of products (Gross).....	\$ 8,511,211	13,006,643†	14,323,372†
Cost of fuel and electricity.....	\$ 1,705,981	2,347,730	2,897,383
Cost of process supplies (Other than fuel and electricity).....	\$ 532,058	712,193	1,018,623
Value of containers.....	\$	1,231,298	1,259,784
Net value of products sold.....	\$ 6,273,172	8,715,422	9,279,164

† Includes value of containers in 1940 and 1941 but not in preceding years.

Table 279.—Capital Employed in the Cement Industry in Canada, 1941

	\$
CAPITAL EMPLOYED AS REPRESENTED BY—	10,250,350
Present cash value of the land.....	32,735,590
Present value of buildings, fixtures, machinery, tools and other equipment.....	1,018,623
Inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand.....	1,350,021
Inventory value of finished products on hand.....	5,753,710
Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).....	51,108,294
Total.....	

Table 280.—Wage-Earners on 15th of Each Month, or Nearest Representative Date, 1940 and 1941

Month	1940	1941	
		Quarry	Mill
January.....	736	133	918
February.....	711	140	918
March.....	795	131	953
April.....	974	153	1,016
May.....	1,021	158	1,019
June.....	1,041	155	1,064
July.....	1,046	162	1,059
August.....	1,052	153	1,024
September.....	1,111	153	1,044
October.....	1,146	151	1,007
November.....	1,100	141	1,004
December.....	923	143	981

THE CEMENT PRODUCTS INDUSTRY

Production of manufactured cement products in Canada during 1941 was valued at \$6,070,677 compared with \$5,303,560 during 1940.

A total of 122 plants operated in this industry during 1941—there being 68 in Ontario, 30 in Quebec, 9 in British Columbia, 6 in Alberta, 1 in Nova Scotia, 2 in New Brunswick, 2 in Manitoba and 4 in Saskatchewan. The Ontario plants accounted for 58 per cent of the total production; establishments in Quebec contributed 31 per cent, and works in British Columbia accounted for 4 per cent, the remaining 6 per cent being distributed among New Brunswick, Nova Scotia, Manitoba, Saskatchewan and Alberta.

Products included ready-mixed concrete worth \$1,834,129, cement pipe of all kinds at \$781,661, hollow building blocks of cement at \$857,440, cinder blocks at \$367,511, artificial stone at \$148,413, cement bricks at \$187,874, and other items, such as haydite blocks and slabs, laundry tubs, burial vaults, etc.

Data presented for this industry cover manufacturing only and do not include figures for the cement work done on the building of bridges, dams, foundations, etc.; this type of work has been covered in the annual survey of Construction.

Table 281.—Products Made in the Cement Products Industry, by Provinces, 1941

Products	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Cement bricks.....	12,877	168,719	5,678	600	187,874
Cement hollow building blocks, etc.....	211,619	625,700	8,890	11,231	857,440
Cement drain pipe, sewer pipe, water pipe and culvert tile.....	259,462	345,618	49,161	127,420	781,661
Artificial stone.....	24,523	119,309	301	4,280	148,413
Cement laundry tubs.....		87,798	18,980		106,778
Cinder blocks.....	40,394	316,572		10,545	367,511
Cement stucco.....			9,628		9,628
Ready mixed concrete.....	935,925	621,868	136,693	139,643	1,834,129
All other products.....	419,498	1,249,328	40,065	59,380	1,768,271
Amount received for repair work.....		8,672		800	8,972
Total.....	1,904,298	3,543,584	269,396	353,399	6,070,677

Table 282.—Materials Used in the Cement Products Industry, by Provinces, 1941

Material	Quebec	Ontario	British Columbia	Other provinces	Canada
	\$	\$	\$	\$	\$
Portland cement.....	454,166	665,226	91,393	81,020	1,291,805
Quicklime.....	685	1,248			1,933
Sand.....	123,762	130,373	18,762	16,233	289,130
Gravel.....	5,814	77,893	19,727	30,597	134,031
Crushed stone.....	148,532	80,178	1,875	1,139	231,714
Cinders.....	9,082	32,243	278	570	42,173
Reinforcing steel.....	67,598	69,722	4,323	3,937	145,580
Other materials.....	48,888	238,810	13,295	1,583	302,576
Boxes, crates, lumber, etc.....	514	68,039	3,558	362	72,473
Total.....	859,031	1,363,732	153,211	135,441	2,511,415

THE CLAY AND CLAY PRODUCTS INDUSTRY

The industrial clays of Canada may be classified as common clays, stoneware clays, fireclays, and china clays. Statistically, the ceramic industry of Canada is conveniently classified into two divisions: (1) Production from domestic clays, which includes the production of building brick, structural tile, drain tile, roofing tile, stoneware, sewer pipe, pottery and refractories, and (2) production from imported clays, which includes the manufacture of electrical porcelain, sanitary ware, sewer pipe, table ware, pottery, ceramic floor and wall tile, and various kinds of fireclay refractories.

A total of 164 plants, representing in the aggregate, a capital investment of \$22,846,741, operated in the domestic and imported clay products industries in Canada during 1941. These two industries provided employment for 4,521 persons during the year; their earnings totalled \$5,245,317. The combined production in 1941 was valued at \$12,947,189 compared with \$10,848,338 in 1940.

(1) PRODUCTION FROM DOMESTIC CLAYS, 1941

The gross value of Canadian producers' sales of domestic clays and products made from same totalled \$7,575,336 in 1941 compared with \$6,344,547 in 1940 and \$13,904,643, the all-time high record established in 1929. Commercial production of domestic clay products in 1941 was reported from every province except Prince Edward Island; no output of these materials has as yet been recorded for the Yukon and Northwest Territories. Of the total value of sales in 1941, Ontario and Quebec firms contributed \$3,087,616 and \$1,944,358 respectively.

Sales of building brick in 1941 totalled 208,871 thousand, valued at \$3,765,493. Sewer pipe shipments aggregated \$1,422,389; hollow blocks, roofing and floor tile, \$1,085,219; drain tile, \$333,364, and pottery, including earthenware, \$502,212.

Fireclay was mined during 1941 in Nova Scotia, Saskatchewan and British Columbia with sales of this material totalling 5,431 short tons valued at \$35,475. Firebrick and other fireclay products made from Canadian clays were evaluated at \$374,394. Bentonite shipments during the year under review amounted to 2,172 short tons valued at \$7,830. Shipments of kaolin were also reported from the province of Quebec in 1941; these totalled 2 short tons appraised at \$30 and represented the first commercial production of the mineral in Canada since 1935.

The number of firms reported as active in the Canadian domestic clay products industry totalled 137 in 1941, of which 71 were located in Ontario, 24 in Quebec, 12 in Alberta, 9 in British Columbia, and the balance in Nova Scotia, New Brunswick, Saskatchewan and Manitoba. Capital employed by the industry, was reported at \$17,377,553, employees numbered 2,881, and salaries and wages paid amounted to \$3,227,785. Fuel and electricity used during 1941 totalled \$1,561,326, and chemicals and various other process supplies consumed were valued at \$207,247.

Data relating to Canadian imports and exports of clay products are being generally withheld from publication until the termination of the war.

Table 283.—Production of Clay Products in Canada from Domestic Clays, by Provinces, 1932-1941 (Gross Values)

Year	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	\$	\$	\$	\$	\$	\$	\$	\$	\$
1932.....	172,557	68,151	1,064,551	1,639,508	49,773	109,739	329,584	216,355	3,650,218
1933.....	125,500	46,917	580,088	1,024,579	20,966	92,207	198,373	174,205	2,262,835
1934.....	157,158	59,897	632,322	1,261,006	37,916	90,997	246,677	194,437	2,680,410
1935.....	270,478	62,478	593,162	1,370,225	74,755	98,150	326,679	216,636	3,012,563
1936.....	355,254	102,256	691,765	1,573,936	55,564	95,584	315,777	280,891	3,471,027
1937.....	406,846	123,876	1,053,153	2,033,845	95,531	115,330	338,638	349,640	4,516,859
1938.....	340,253	123,625	1,022,194	2,083,496	105,334	118,713	377,337	365,132	4,536,084
1939.....	339,952	129,985	1,274,776	2,346,638	78,892	148,774	461,079	371,140	5,151,236
1940.....	490,543	171,745	1,546,246	2,508,540	102,906	164,828	838,856	520,883	6,344,547
1941.....	529,435	193,643	1,944,358	3,087,616	84,817	224,897	952,144	558,426	7,575,336

Table 284.—Production (Sales) of Domestic Clay and Clay Products in Canada, 1940-1941

Products	Unit of measure	Sales or shipments			
		1940		1941	
		Quantity	\$	Quantity	\$
Clay—Bentonite.....	ton	1,469	4,488	2,172	7,830
Fireclay.....	ton	4,881	30,564	5,431	35,475
Kaolin.....	ton			2	30
Other clay.....	ton	16,543	27,310	21,620	34,807
Fireclay blocks and shapes.....			85,127		190,497
Firebrick.....	M	3,167	165,525	3,643	183,897
Brick—Soft mud process—Face.....	M	15,946	323,634	14,288	285,260
Common.....	M	40,395	611,750	30,664	455,385
Stiff mud process—Face.....	M	41,552	903,636	52,419	1,218,632
(wire cut) Common.....	M	52,777	738,416	69,756	1,043,832
Dry press—Face.....	M	14,932	333,717	15,621	363,908
Common.....	M	24,870	351,335	25,449	386,097
Fancy or ornamental brick (including special shapes, embossed and enamelled brick).....	M	47	2,477	36	2,100
Sewer brick.....	M	694	12,222	644	10,279
Paving brick.....	M	19	819	120	7,312
Structural tile.....					
Hollow blocks (including fireproofing and load-bearing tile).....	ton	105,073	788,478	117,530	1,063,120
Roofing tile.....			1,839		750
Floor tile (quarries).....			13,631		21,349
Drain tile.....	M	10,550	277,551	12,319	333,364
Sewer pipe (including copings, flue linings, conduits, etc.).....			1,152,603		1,422,389
Pottery, glazed or unglazed (including coarse earthenware, sanitary ware, stoneware, flower pots, and all other pottery).....			474,452		502,212
Other products.....			44,973		6,811
Total.....			6,344,547		7,575,336

In addition to the clays recorded in the above table, there were 185,954 tons of ordinary clay consumed in Canada during 1941 in the production of Portland cement; the corresponding consumption in 1940 was 144,152 tons. Also consumed by the Canadian cement industry in 1941 were 26,837 tons of shale.

Table 285.—Production of Building Brick in Canada, 1932-1941

		Soft mud process		Stiff mud process (wire cut)		Dry press		Fancy or orna- mental brick	Sewer brick	Total
		Face	Common	Face	Common	Face	Common			
1932	M	6,188	12,801	30,197	40,753	5,522	4,248	125	643	100,477
	\$	108,582	182,372	664,756	638,922	119,547	46,762	6,237	12,156	1,779,334
1933	M	2,482	12,389	19,602	23,894	4,544	3,916	630	243	67,700
	\$	41,737	156,769	412,367	356,498	101,252	44,377	7,824	3,693	1,124,517
1934	M	4,904	14,256	23,800	30,317	6,005	6,440	43	307	86,072
	\$	76,247	183,585	494,341	424,131	130,392	66,616	2,625	5,992	1,383,929
1935	M	6,695	21,197	25,289	32,334	8,454	6,881	13	175	100,538
	\$	122,215	259,504	500,066	437,123	175,042	55,253	728	5,236	1,555,167
1936	M	6,097	24,180	30,218	35,592	8,961	10,241	25	418	115,732
	\$	111,378	302,690	575,765	484,078	165,924	100,785	1,374	6,778	1,748,772
1937	M	9,904	23,636	37,610	55,689	12,565	14,136	55	175	153,770
	\$	175,544	316,534	735,615	755,630	233,542	152,662	2,972	2,777	2,375,276
1938	M	10,838	24,104	34,179	50,734	13,125	15,536	63	228	148,807
	\$	208,610	313,082	671,471	681,744	266,039	192,741	4,175	3,581	2,341,443
1939	M	10,927	26,652	45,993	61,114	12,263	17,790	68	217	165,024
	\$	182,376	372,116	941,696	692,224	242,518	236,597	4,601	4,506	2,676,634
1940	M	15,946	40,395	41,552	52,777	14,932	24,870	47	694	191,213
	\$	323,634	611,750	903,636	738,416	333,717	351,335	2,477	12,222	3,277,187
1941	M	14,288	30,664	52,419	69,750	15,621	25,449	36	644	208,871
	\$	285,260	455,385	1,218,632	1,043,832	363,908	386,097	2,100	10,279	3,765,493

Table 286.—Production of Building Brick in Canada—Per Capita of Population for Years Specified

Year	M per capita	Year	M per capita
1905	0-087	1935	0-009
1914	0-070	1936	0-010
1924	0-035	1937	0-014
1929	0-046	1938	0-013
1930	0-031	1939	0-015
1933	0-006	1940	0-017
1934	0-008	1941	0-018

Table 287.—Production of Paving Brick in Canada, 1932-1941

Year	Quantity		Value
	M	\$	
1932	6	155	
1933	1	42	
1934	10	382	
1935	15	627	
1936	116	3,149	
1937	3	131	
1938	1	34	
1939	157	6,089	
1940	11	819	
1941	120	7,312	

Table 288.—Production of Structural Tile in Canada, 1932-1941

Year	Hollow Blocks (*)		Roofing Tile		Floor Tile (Quarries)	
	Short tons	\$	No.	\$	Sq. ft.	\$
1932	48,118	421,672	48,939	3,900	94,316	21,502
1933	26,747	160,059	20,469	1,136	91,495	14,297
1934	31,136	244,122	44,115	1,852	80,356	17,491
1935	(a) 47,195	344,608	82,015	3,669	51,765	7,629
1936	58,501	467,860	52,730	2,139	97,738	13,798
1937	64,526	533,843	60,542	3,302	73,191	12,169
1938	70,648	591,416	150,504	5,196	100,958	15,330
1939	86,120	714,291	148,291	4,964	90,812	15,233
1940	109,073	788,478	41,772	1,839	(b)	13,631
1941	117,530	1,063,120	(b)	750	(b)	21,349

(*) Including fireproofing and load-bearing tile.

(a) In addition, there was produced \$615 worth of ceramic tile.

(b) Data not available.

Table 289.—Production of Sewer Pipe, Copings, Flue Linings, etc., in Canada, 1932-1941

Year	Value	Year	Value
	\$		\$
1932.....	813,224	1937.....	790,210
1933.....	354,458	1938.....	778,107
1934.....	436,432	1939.....	813,208
1935.....	481,550	1940.....	1,152,603
1936.....	588,485	1941.....	1,422,389

Table 290.—Production of Drain Tile in Canada, 1932-1941

Year	Quantity	Value	Year	Quantity	Value
	M	\$		M	\$
1932.....	7,385	186,670	1937.....	11,391	298,970
1933.....	10,057	222,829	1938.....	12,862	322,774
1934.....	7,335	180,553	1939.....	14,361	353,973
1935.....	7,124	205,336	1940.....	10,550	277,551
1936.....	8,148	214,549	1941.....	12,319	333,364

Table 291.—Production of Pottery† from Domestic Clays in Canada, 1932-1941

Year	Value	Year	Value
	\$		\$
1932.....	244,861	1937.....	232,209
1933.....	202,500	1938.....	235,890
1934.....	223,733	1939.....	*280,420
1935.....	220,711	1940.....	474,452
1936.....	218,402	1941.....	502,212

† Including coarse earthenware, stoneware, flower pots, and all other pottery.

* In addition \$2,292 worth of sanitaryware was produced.

Table 292.—Production of Kaolin* and Fireclay in Canada, 1932-1941

Year	Kaolin		Fireclay		Year	Kaolin		Fireclay	
	Quantity	Value	Quantity	Value		Quantity	Value	Quantity	Value
	Tons	\$	Tons	\$		Tons	\$	Tons	\$
1932.....			990	11,826	1937.....			4,123	26,091
1933.....			1,421	11,273	1938.....			2,344	17,243
1934.....	48	604	1,043	12,598	1939.....			10,045	30,824
1935.....	170	1,520	2,272	15,574	1940.....			4,881	39,564
1936.....			2,437	17,639	1941.....	2	30	5,431	35,475

* Produced in the province of Quebec.

Table 293.—Production of Firebrick and Fireclay Blocks and Shapes in Canada, from Domestic Clays, 1932-1941

Year	Firebrick		Fireclay blocks and shapes	Year	Firebrick		Fireclay blocks and shapes
	Quantity	Value	Value		Quantity	Value	Value
	M	\$	\$		M	\$	\$
1932.....	1,580	71,757	75,209	1937.....	2,950	142,827	75,431
1933.....	1,547	73,226	80,625	1938.....	2,213	113,581	73,512
1934.....	2,109	101,219	62,388	1939.....	2,331	119,349	95,256
1935.....	1,817	90,149	71,344	1940.....	3,167	165,525	85,127
1936.....	2,538	118,923	65,171	1941.....	3,643	183,897	190,497

BENTONITE

(Bureau of Mines, Ottawa)

Bentonite, mainly of the highly-colloidal, "swelling" variety, is widely distributed over large areas of the Prairie Provinces, where it occurs at several horizons in the Upper Cretaceous sediments. The more important known deposits are exposed mainly in areas dissected by drainage channels where they show as beds in the slopes bordering valleys, and in the sides or on top of small buttes in typical "bedland" topography. Thus, many of the chief exposures are found in the Red Deer Valley section of Alberta; over a wide area in southern Saskatchewan, and in the district around Morden, in southern Manitoba. One lower-lying bed occurs as a persistent parting in the No. 1 or main coal seam mined at a number of points in the Drumheller district, Alberta, as well as near Cluny, farther east. Other exposures exist in the Edmonton region, Alberta, and farther west, on McLeod river, near Edson. In British Columbia, a deposit of unusual thickness occurs in Tertiary beds near Merritt and at Princeton.

Several of the above occurrences have been mined on a small scale, but the total production to date is comparatively small. Most of the output has been derived from the Drumheller area in the Red Deer Valley, Alberta, and from the Morden area, in Manitoba.

Canada exports little or no bentonite. Substantial quantities of activated clay of the Filtrol type are imported from the United States for bleaching in oil refineries and for packing-house products and possibly also some ground natural bentonite for similar use. Considerable quantities of American ground bentonite for foundry use and for other minor industrial purposes are also imported.

About 38 per cent of the sales in the United States in 1940 was used for oil bleaching, mostly after acid activation; 18 per cent in drilling muds; and 30 per cent in foundry work. A large part of the clay used in the activated form is obtained from Mississippi.

Canada probably possesses ample reserves of bentonite of foundry quality to supply domestic requirements, but freight rates to the main consuming centres have proved an obstacle to development in the face of low-priced American clay.

Wyoming dried and granulated clay sold in 1941 for \$7.50 per ton, f.o.b. mines, in bulk, and air-floated 200-mesh material for \$9.50 bagged, whereas similar material from Alberta has been quoted at \$38. Selected, air-floated Wyoming clay was priced at \$26 per ton f.o.b. Chicago. Freight rates from Wyoming points to Montreal are about \$13.50 per ton. Imported activated (Filtrol-type) bentonite in 1941 cost \$75 to \$80 per ton, in carload lots, delivered Eastern Canadian points, while American natural bleaching clay from Texas was quoted at \$25 per ton laid down.

Table 294.—Production (Sales) of Bentonite in Canada, by Provinces, 1932-1941

Year	Manitoba		Alberta		British Columbia		Canada	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1932.....					7	176	7	176
1933.....					55	1,363	55	1,363
1934.....					63	1,578	63	1,578
1935.....					41	781	41	781
1936.....					120	180	120	180
1937.....	132	1,154			31	817	163	1,971
1938.....			1,136	3,444	43	215	1,179	3,659
1939.....	99	591	889	2,850			988	3,441
1940.....	710	2,023	714	2,240	45	225	1,469	4,488
1941.....	760	1,330	1,317	5,882	95	618	2,172	7,830

Table 295.—Fuller's Earth Used in Canada in the Manufacture of Soaps and Washing Compounds and in the Petroleum Products Industry, 1932-1941

Year	Petroleum products industry		Soaps and washing compounds	
	Pounds (*)	\$	Pounds	\$
1932.....	19,642,179	258,934	507,807	7,444
1933.....	22,811,655	314,515	588,434	8,501
1934.....	18,588,514	239,357	508,316	6,562
1935.....	18,487,148	260,885	660,018	13,694
1936.....	18,907,295	243,164	1,328,219	20,601
1937.....	18,843,458	240,309	1,167,768	20,393
1938.....	19,867,467	281,668	1,195,208	19,575
1939.....	19,814,473	304,214	1,586,163	30,924
1940.....	23,828,660	406,185	1,651,471	40,695
1941.....	30,155,750	571,010	1,486,000	39,332

(*) Includes all clay.

Table 296.—China Clay (Kaolin) Used in the Manufacture of Paper in Canada, 1932-1941

Year	Tons	Value	Year	Tons	Value
1932.....	14,432	\$ 205,068	1937.....	41,738	\$ 578,223
1933.....	20,048	267,014	1938.....	34,968	488,147
1934.....	27,550	357,286	1939.....	32,769	430,092
1935.....	33,766	422,584	1940.....	36,931	558,659
1936.....	39,165	520,121	1941.....	32,844	588,585

Table 297.—Clays and Earths Used in Canadian Rubber Industry, 1933-1941

Year	Tons	Value	Year	Tons	Value
1933.....	1,391	\$ 32,361	1938.....	2,942	\$ 81,935
1934.....	2,391	54,368	1939.....	3,438	80,745
1935.....	2,639	63,553	1940.....	3,586	90,867
1936.....	3,017	70,709	1941.....	4,059	101,441
1937.....	3,614	79,300			

Table 298.—Fuller's and Infusorial Earth Used in Specified Canadian Industries, 1932-1941

Year	Sugar refineries		Vegetable oil mills	
	Pounds	\$	Pounds	\$
1932.....	(a)	(a)	102,650	1,673
1933.....	(a)	(a)	126,880	2,730
1934.....	(a)	(a)	115,120	2,171
1935.....	(a)	(a)	88,980	2,425
1936.....	(b) 59,200	1,730	243,720	10,044
1937.....	(c) 4,586,876	95,532 (†)	212,997	9,349
1938.....	(c) 4,908,597	101,473	190,253	9,063
1939.....	(c) 44,819,811	105,711 (b)	207,105	10,166
1940.....	(c) 4,984,362	112,369 (b)	216,254	7,731
1941.....	(c) 5,333,131	133,129 (b)	275,280	10,604

(a) Not recorded. (b) Fullers' earth. (c) Infusorial earth. (†) Includes other earth.

NOTE.—In addition to the consumption recorded, there is a considerable quantity of Fullers' earth used in the laughing industry.

Table 299.—Firebrick and Fireclay Used in the Manufacture of Iron and Steel and Their Products in Canada, 1932-1941

Year	Firebrick		Fireclay		Cupola blocks
	Number	Value	Number	Value	
1932.....	3,409,000	\$ 123,532	5,910	\$ 52,492	36,395
1933.....	1,846,016	141,784	7,615	62,602	11,628
1934.....	2,590,452	192,538	8,248	75,906	21,488
1935.....		451,604	11,510	101,601	28,064
1936.....				\$ 779,014	
1937.....				\$1,058,787	
1938.....				\$ 838,012	
1939.....				\$ 939,495	
1940.....				\$1,539,915	
1941.....				\$2,517,457	

PRICES—(a)

Bentonite—per ton, carload lots, f.o.b. Wyoming mines, dried and crushed, in bulk, \$7.50; pulverized, 200 mesh, \$9.50 in 100-lb. paper bags.

China Clay (Kaolin)—per ton, f.o.b. South Carolina and Georgia mines, in bulk: saggar clays, \$2.50 to \$3.50; tailings, \$4.50 to \$5.00. No. 2 grades, \$5.50 to \$6.00; No. 1 grades, air-floated, crude, \$6.75 to \$8.00; No. 1 washed, \$8.00. Florida: washed, crushed, bulk, \$11.75; air-floated and washed, \$14 to \$15. Maryland: ball clays, shredded bulk, \$3.00 to \$7.00; air-floated, in paper bags, \$10.10 to \$18.25; New Jersey: plastic kaolin, pulverized, in paper bags, \$10.25 to \$10.75. Insecticide clay, \$11.50 to \$16.50; Imported English, per long ton, C and F. American ports: lump, \$26 to \$28 in bulk; air-floated \$40 to \$60 nominal.

Fuller's Earth—per ton, f.o.b. Colorado, \$9; f.o.b. Georgia or Florida, 30 to 60 mesh, \$14.50; 15 to 30, \$14; 200 and up, \$10; 100 and up \$7.

(b) **Fuller's Earth**—English, long ton, nominal; Georgian, carlots, long ton \$27.78.

China Clay—Imported, carlots, bulk, ton \$25 to \$50 (U.S. only). Pigment clay for rubber, carlots, bags, ton \$23.00 less carlots, ton, \$26.50. Kaolin (refined grades), cwt. \$4.80, specially refined 10 cents a pound.

(a) "Engineering & Mining Journal's Metal & Mineral Markets"—New York, November, 1942.

(b) F.O.B. market at Toronto—"Canada Chemistry & Process Industries"—Toronto, December, 1942.

Table 300.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1941

Industry and province	Capital employed as represented by:					Total
	Present value of land†	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel, etc.	Inventory value of finished products on hand	Operating capital, including cash, bills and accounts receivable, etc.	
	\$	\$	\$	\$	\$	\$
By INDUSTRIES—						
*Brick and Tile—						
Nova Scotia.....	114,463	584,896	38,526	47,469	107,798	893,152
New Brunswick.....	20,567	154,629	3,190	24,065	14,913	217,364
Quebec.....	377,997	2,590,186	80,932	413,350	646,672	4,109,137
Ontario.....	1,244,070	3,674,350	131,404	743,870	1,795,471	7,589,165
Manitoba.....	14,000	96,921	3,000	21,780	79,293	214,994
Saskatchewan.....	262,791	307,121	120,508	45,467	85,006	820,893
Alberta.....	122,979	1,540,678	67,338	115,093	193,426	2,039,514
British Columbia.....	139,361	409,034	13,367	110,403	178,261	850,426
Total for Canada.....	2,296,228	9,357,815	458,265	1,521,497	3,100,840	16,734,645
Stoneware and pottery—						
Total for Canada.....	47,519	366,134	47,368	52,605	129,282	642,908
By PROVINCES—						
Total for clay and clay products						
Nova Scotia.....	114,463	584,896	38,526	47,469	107,798	893,152
New Brunswick.....	27,759	166,671	6,395	29,995	25,406	256,226
Quebec.....	384,547	2,603,486	82,289	414,047	647,280	4,131,619
Ontario.....	1,256,070	3,694,350	132,384	751,472	1,805,389	7,639,665
Manitoba.....	14,000	96,921	3,000	21,780	79,293	214,994
Saskatchewan.....	262,791	307,121	120,508	45,467	85,006	820,893
Alberta.....	144,756	1,861,470	109,164	153,469	301,689	2,570,548
British Columbia.....	139,361	409,034	13,367	110,403	178,261	850,426
Canada.....	2,343,747	9,723,949	505,633	1,574,102	3,230,122	17,377,553

*Clay, sewer pipe, firebrick products and other clays included under brick and tile.

†Excluding unmined material.

Table 301.—Employees, Salaries and Wages in the Clay Products Industry in Canada, by Provinces, 1941

Province	*Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....	11	189	200	34,603	155,129	189,732
New Brunswick.....	7	64	71	9,074	58,811	67,885
Quebec.....	60	620	680	137,702	603,564	741,266
Ontario.....	132	1,028	1,160	265,410	1,156,722	1,422,132
Manitoba.....	5	56	61	14,500	37,394	51,894
Saskatchewan.....	9	38	47	22,157	53,225	75,382
Alberta.....	34	407	441	72,351	333,632	405,983
British Columbia.....	24	197	221	46,752	226,759	273,511
Canada.....	282†	2,599	2,881	602,549	2,625,236	3,227,785

*See note, page 32.

†Includes 41 female salaried workers.

Table 302.—Average Number of Wage-Earners, by Months, 1939-1941

Month	1939	1940	1941	
			Pit	Plant
January.....	838	1,190	147	1,760
February.....	743	1,051	121	1,671
March.....	990	1,287	122	1,749
April.....	1,358	1,739	196	2,231
May.....	2,286	2,647	393	2,857
June.....	2,741	3,143	427	2,942
July.....	2,879	3,191	399	2,882
August.....	2,761	3,027	362	2,708
September.....	2,428	2,812	288	2,581
October.....	2,047	2,530	255	2,373
November.....	1,975	2,300	204	2,220
December.....	1,572	2,151	163	1,990

2. Products from Imported Clays

This industry covers the operations of Canadian plants which were occupied chiefly in making ceramic products from imported clays. Products made in these plants during 1941 included high tension insulators, vitreous china sanitary ware, china dinnerware, firebrick, sewer pipe, floor and wall tile, refractory cements, electrical porcelains, etc.

Twenty-two plants reported in this group for 1941 and their output was valued at \$5,371,853, against last year's total of \$4,503,791 and the 1939 figure of \$2,971,979. Capital employed amounted to \$5,469,188. The average number of workers was 1,640 and payments for salaries and wages totalled \$2,017,532. Fuel and electricity cost \$388,106 and materials for use in manufacturing processes cost \$1,331,608.

Table 303.—Products Made in the Imported Clay Products Industry, 1940 and 1941

Products	1940	1941
	Gross selling value at works	Gross selling value at works
	\$	\$
Firebrick and stove linings—Rigid.....	534,943	661,633
Plastic.....	146,904	193,093
High temperature cements.....	87,418	105,467
High tension porcelain insulators, china sanitary ware, clay sewer pipe, floor and wall tile, pottery, china tableware, etc.....	3,734,526	4,411,660
(Separate figures cannot be shown for these items as there were only one or two producers in each case).		
Total.....	4,503,791	5,371,853

NOTE.—Clay firebrick, floor tile, sewer pipe and pottery are also made in Canada from domestic clays. High temperature cements and refractory bricks are made also by concerns in other industries, i.e. silica brick etc.

Table 304.—Materials Used in the Imported Clay Products Industry, 1940 and 1941

Material	1940		1941	
	Short tons	Total cost at works	Short tons	Total cost at works
		\$		\$
Imported clays—Ball clay.....	3,348	58,800	3,746	71,966
China clay.....	3,382	72,182	3,504	76,768
Fireclay.....	34,153	203,744	39,423	277,448
Saggur clay.....	904	12,776	976	15,008
Other Imported clays.....	4,782	16,151	1,161	20,820
Canadian clays—Fireclay.....	2	20	2	20
Other clays.....	100	1,900	215	1,669
Feldspar.....	3,305	70,788	3,333	74,247
Silica and ground quartz.....	3,426	53,690	4,055	63,116
Talc.....	511	7,635	762	11,542
Other glazing materials.....		35,773		37,742
Insulator hardware.....		238,076		230,375
Shipping containers and packing materials.....		105,349		149,739
All other materials.....		208,285		301,148
Total.....		1,084,669		1,331,608

LIME INDUSTRY

Production of quick and hydrated lime in Canada during 1941 totalled 860,885 short tons valued at \$6,357,941 compared with 716,730 short tons worth \$5,194,555 in 1940. The output in 1941 comprised 723,864 short tons of quick lime valued at \$5,287,711 and 137,021 short tons of hydrated lime at \$1,070,230. During the year under review, 665,319 short tons of quick lime and 86,202 short tons of hydrated lime were sold or used by lime producers for chemical manufacture, while the balance of Canadian lime production, totalling 109,364 tons and comprising both the quick and hydrated varieties was sold or used for building, agricultural and other purposes.

Stone used in the production of lime in Canada includes calcium, high calcium and dolomitic varieties of limestone. It is estimated that about 1,530,200 tons of limestone were consumed in the production of lime in 1941. Lime was produced in all Canadian provinces with the exception of Prince Edward Island and Saskatchewan; no commercial production of lime in the Territories has ever been officially reported. Of the total Canadian output of lime in 1941, Ontario plants produced 431,125 tons or about 50 per cent, and Quebec 306,515 tons or nearly 36 per cent. Data relating to Canadian imports and exports are not available for publication during the war and such information is supplied only for confidential use by the External Trade Branch of the Dominion Bureau of Statistics, Ottawa.

During 1941 the industry reported 50 plants as active; capital employed totalled \$4,633,946 and \$1,321,571 in salaries and wages were distributed to 1,105 employees. The cost of fuels and purchased electricity used amounted to \$2,008,142 and the value of explosives, chemicals and other process supplies consumed aggregated \$188,387.

Lime is marketed in the form of quicklime and in the hydrated state, the latter being a specially prepared slaked lime in the form of a fine powder that is usually marketed in 50-pound, multi-wall paper bags.

Quicklime is marketed in the lump, pebble, crushed and pulverized forms; lump lime and pebble lime are sold either in bulk or packed in barrels; crushed lime (1 inch and under) and pulverized lime (ground to minus 20 mesh, and in some plants to minus 50 mesh) are sold in airtight multi-wall paper bags.

Prices of the various lime products vary over a wide range depending on the geographical position of the plants and on differences in quality of the lime.

A review of lime in 1941 by the Bureau of Mines, Ottawa, contains the following information:

"Aged lime putty and lime mortar for use in building construction are now available in a number of Canadian cities. Lime mortar is coming back into favour as a binder in masonry, and sales of lime for this purpose have increased very considerably within the past two years and, with the present high degree of activity in the construction industry, are expected to increase further in 1942.

"Much attention has been devoted recently to methods of hydrating the magnesia when preparing hydrate from dolomitic lime, and hydrators operating on the principle of the autoclave are now in use for this purpose. The practice of passing hydrated lime through tube mills is employed in some plants in the United States with the object of increasing the plasticity. Recent research in the United States on stabilization of clay-soil roads with hydrated lime has shown that on certain clays better results are obtained with lime than with other stabilizing materials.

"There are many prospective lime-producing localities in Canada because of the abundance of suitable limestone throughout the country. With the northward development of the mining industry, considerable interest is being manifested in making lime from limestone deposits in the far north."

Table 305.—Production of Lime in Canada, 1930-1941

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1930.....	490,892	4,038,688	1936.....	468,401	3,335,970
1931.....	344,785	2,764,415	1937.....	549,353	3,824,917
1932.....	320,650	2,394,537	1938.....	486,922	3,542,652
1933.....	323,540	2,432,306	1939.....	552,209	(a) 4,003,514
1934.....	368,113	2,745,797	1940.....	716,730	(b) 5,194,555
1935.....	405,419	2,925,791	1941.....	860,885	(c) 6,357,941

(a) Includes 263,957 tons used by producers.

(b) Includes 357,550 tons used by producers.

(c) Includes 409,524 tons used by producers.

Table 306.—Production of Lime in Canada, by Provinces, 1941, Showing Purposes for Which Used (*) or Sold

	Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
(1 ton=2,000 pounds)						
QUICKLIME						
Building trades—						
Finishing lime..... ton		1,192	3,583	3,415	118	8,398
..... \$		11,072	23,253	27,077	2,990	64,392
Masons' lime..... ton	2,322	5,477	12,365	1,313		21,478
..... \$	21,121	63,992	107,722	13,677		206,515
Sand-lime brick..... ton		1,786	6,448	40		8,271
..... \$		8,478	44,260	1,032		53,770
Agriculture..... ton	195	2	293		79	569
..... \$	2,000	34	1,376		454	3,864
CHEMICAL—						
Smelters (non-ferrous)..... ton		1,724	5,751	3,007	29	10,511
..... \$		11,068	34,941	20,070	175	76,254
Iron and steel furnaces (a)..... ton	23,179	3,876	34,469	181	35	61,740
..... \$	219,567	30,730	248,326	1,429	211	599,263
Cyanide mills (gold mines)..... ton		4,163	15,567	7,847	930	28,597
..... \$		31,801	97,135	67,219	5,599	201,754
Pulp and paper mills..... ton	9,311	105,740	8,289	10,959	19,223	153,532
..... \$	75,003	653,226	56,905	79,232	139,181	1,003,547
Glass works..... ton			11,909	175		12,084
..... \$			79,773	1,382		81,155
Sugar refineries..... ton	200	20	7,642	8,217	45	16,124
..... \$	1,800	240	78,466	65,736	271	146,513
Tanneries..... ton		1,080	3,402	2		4,484
..... \$		9,030	22,849	20		31,899
Fertilizer plants..... ton			350			350
..... \$			2,725			2,725
Insecticide plants..... ton	40		1,430		214	1,714
..... \$	560		9,681		1,469	11,710
Other chemical works..... ton	80	112,736	261,463	2,004		376,283
..... \$	800	891,273	1,832,853	16,322		2,741,258
Uses unspecified..... ton		8,018	966	1,590	9,372	19,916
..... \$		80,660	9,039	15,974	56,419	162,092
Total quicklime..... ton	35,328	245,814	373,927	38,720	30,075	723,864
..... \$	320,854	1,791,601	2,619,391	319,180	236,769	5,287,711

Table 306.—Production of Lime in Canada, by Provinces, 1941, Showing Purposes for Which Used (*) or Sold—Concluded

	Nova Scotia and New Brunswick	Quebec	Ontario	Manitoba and Alberta	British Columbia	Total Canada
HYDRATED LIME						
	(1 ton=2,000 pounds)					
Building trades—						
Finishing lime.....ton	54		20,346	5,863		26,263
\$	560		250,524	99,683		350,767
Masons' lime.....ton	832	1,664	9,317			11,813
\$	7,156	24,146	82,237			113,539
Sand-lime brick.....ton						
\$						
Agriculture.....ton	1,070	588	2,962		3,787	8,497
\$	8,870	4,891	29,917		26,016	69,694
CHEMICAL—						
Smelters (non-ferrous).....ton		37,739	19,689	20	650	58,098
\$		94,348	184,151	200	4,465	283,164
Iron and steel furnaces.....ton			104			104
\$			1,115			1,115
Cyanide mills.....ton		4,788	580	255		5,623
\$		24,850	6,181	2,550		33,581
Pulp and paper mills.....ton	5,175	6,514	142			11,831
\$	40,000	53,230	1,474			94,704
Sugar refineries.....ton	82	180	93			355
\$	750	1,620	978			3,348
Tanneries.....ton		356	574			930
\$		2,833	6,151			8,984
Fertilizer plants.....ton		5,546	272			5,818
\$		33,276	2,346			35,622
Insecticide plants.....ton	152				36	188
\$	1,520				247	1,767
Other chemical works.....ton		213	2,850	192		3,255
\$		1,763	29,308	3,175		34,246
Uses unspecified.....ton		3,113	269		954	4,336
\$		30,183	2,962		6,554	39,699
Total hydrated lime.....ton	7,365	60,701	57,198	6,330	5,427	137,021
\$	58,856	271,140	597,344	105,608	37,282	1,070,230
Grand Total.....ton	42,693	306,515	431,125	45,050	35,502	880,885
\$	379,710	2,062,744	3,246,648	424,788	244,051	6,357,941

(a) Includes calcined dolomite used as a refractory material.

(*) Not necessarily consumed in provinces where produced.

NOTE.—Of the total quantity of 880,885 tons of lime produced, 409,524 tons were consumed by the producers themselves.

Table 307.—Lime Sold or Used for Chemical and Other Purposes and Value of Contracts in Canada, 1930-1941

Year	Lime sold or used for chemical purposes		Lime sold or used for building or other non- chemical purposes		Value of con- struction contracts awarded in Canada (a)
	short tons	\$	short tons	\$	
1930.....	351,443	2,596,112	139,359	1,442,586	456,999,600
1931.....	231,837	1,637,319	112,948	1,127,093	315,482,000
1932.....	255,472	1,758,898	65,178	635,639	132,872,400
1933.....	235,810	1,664,946	87,730	767,360	97,289,800
1934.....	229,906	1,598,906	138,207	1,146,891	125,811,500
1935.....	260,885	1,775,657	144,534	1,150,134	160,305,000
1936.....	(b) 389,324	2,670,266	79,077	665,704	162,588,000
1937.....	(c) 466,796	3,112,147	82,557	712,770	224,056,700
1938.....	(d) 403,825	2,746,927	83,097	795,725	187,277,900
1939.....	(e) 455,148	3,059,306	97,061	944,208	187,178,500
1940.....	(f) 612,900	4,201,316	103,830	993,237	346,009,800
1941.....	(g) 751,521	5,293,609	109,364	1,064,332	393,991,300

(a) Compiled by McLean Building Reports Ltd.

(b) 349,940 tons quicklime; 39,384 tons hydrated lime.

(c) 421,867 tons quicklime and 44,929 tons hydrated lime.

(d) 373,278 tons quicklime and 30,547 tons hydrated lime.

(e) 424,287 tons quicklime and 30,861 tons hydrated lime.

(f) 568,479 tons quicklime and 44,421 tons hydrated lime.

(g) 665,319 tons quicklime and 86,202 tons hydrated lime.

Table 308.—Number of Firms, Employees, Salaries and Wages and Net Value of Lime (Quick and Hydrated) Sold or Used, by Provinces, 1941

Province	Number of firms	Number of employees		Salaries and wages	Fuel, electricity and process supplies used	Production Net value
		Salaried employees	Wage-earners			
				\$	\$	\$
New Brunswick (†).....	6	7	123	155,376	88,316	291,394
Quebec.....	15	27	392	437,801	1,099,006	963,738
Ontario.....	14	31	278	450,576	817,753	2,428,895
Manitoba.....	3	6	92	95,266	98,542	174,950
Alberta.....	4	3	36	52,232	42,406	108,890
British Columbia.....	3	16	92	130,320	50,506	193,545
Canada.....	45	92	1,013	1,321,571	2,196,529	4,161,412

(†) Includes data for two firms operating in Nova Scotia.

Table 309.—Capital Employed in the Lime Industry in Canada, by Provinces, 1941

Province	Capital employed as represented by:					Total
	Present cash value of land	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of stone on hand, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash bills and accounts receivable, prepaid expenses, etc.)	
	\$	\$	\$	\$	\$	\$
New Brunswick (*).....	25,500	107,000	13,900	3,900	53,600	203,900
Quebec.....	17,150	517,967	178,903	14,966	228,424	957,410
Ontario.....	141,038	1,683,345	352,942	15,428	36,112	2,228,865
Manitoba.....	477,442	20,000	25,655	4,819	.....	527,916
Alberta.....	2,500	184,068	6,301	4,765	37,904	235,538
British Columbia.....	5,000	253,017	69,275	26,916	126,109	480,317
Canada.....	668,630	2,765,397	646,976	70,794	482,149	4,633,946

(*) Includes data for two firms in Nova Scotia.

Table 310.—Number of Wage-Earners on Payroll or Time Record on the Last Day of Each Month or Nearest Representative Date, 1941

Month	Quarry	Kiln	Month	Quarry	Kiln
January.....	300	605	July.....	379	705
February.....	310	630	August.....	372	660
March.....	343	656	September.....	375	660
April.....	350	665	October.....	373	674
May.....	375	668	November.....	365	659
June.....	368	674	December.....	353	631

SAND-LIME BRICK INDUSTRY

Six plants in Canada were engaged chiefly in making sand-lime building brick during 1941. Four of these were located in Ontario, 1 in Quebec and 1 in Manitoba. Production, including some cement blocks and bricks, was valued at \$431,359, an increase of 34.8 per cent over the 1940 total of \$319,909.

Capital invested in these works amounted to \$454,035. An average of 139 people were employed and they were paid \$164,802 in salaries and wages. Expenditures for fuel and electricity amounted to \$39,919, and for processing materials to \$142,942.

Production of sand-lime brick amounted to 19,223 M valued at \$230,030, an increase in both quantity and value over the output of 17,405 M brick at \$196,423 in the previous year. Production value of sand-lime building blocks dropped to \$46,665 from \$47,565.

Table 311.—Products Made, 1940 and 1941

Products	1940		1941	
	Quantity	Selling value at works	Quantity	Selling value at works
		\$		\$
Sand-lime brick.....M	17,405	196,423	19,223	230,030
Sand-lime building blocks.....M		47,565		46,665
Other products (*).....		75,921		154,664
Total.....		319,909		431,359

(*) Includes cement blocks, cinder blocks and insulating brick.

Table 312.—Materials Used in Manufacturing, 1940 and 1941

Materials	Unit of measure	1940		1941	
		Quantity	Cost at works	Quantity	Cost at works
			\$		\$
Cement, Portland.....	bbl.	6,773	14,941	13,175	26,550
Quicklime.....	ton	5,237	42,328	5,157	41,674
Sand and gravel.....	cu. yd.	53,823	44,340	60,973	47,647
Cinders.....	cu. yd.	6,216	5,019	8,614	7,466
Other materials.....			10,355		19,605
Total.....			116,985		142,942

SAND AND GRAVEL INDUSTRY

Commercial production of sand and gravel in Canada during 1941 totalled 31,604,806 short tons valued at \$10,375,723 compared with 31,375,415 short tons worth \$11,759,245 in 1940. In the totals for both 1941 and 1940 are sand and gravel from all sources, including recoveries by dredges and material used by railroads as ballast and by mines as backfill.

Quebec and Ontario are Canada's largest sand and gravel producing provinces, the output in these provinces in 1941 being, respectively, 11,681,390 short tons and 11,569,382 short tons; in 1941, the quantity of material washed or screened at Canadian sand and gravel plants totalled 4,458,426 short tons compared with 3,589,933 short tons in 1940, while the quantity of bank or pit-run grades amounted to 27,146,380 short tons as against a corresponding tonnage of 27,785,482 in the preceding year.

Of the total sand and gravel output in 1941, there were 19,769,798 tons used for concrete, roads, etc., and 4,836,908 tons as railroad ballast. In addition there were produced 2,192,405 tons of straight run sand for building, etc., 38,309 tons for moulding; 37,541 tons as core sand and 92,018 tons for other purposes. The quantity of crushed gravel produced during the year under review amounted to 3,274,510 tons, and 1,363,317 tons of sand were employed as mine fill.

Firms (including individuals) reported as active in the Canadian sand and gravel industry numbered 1,399 in 1941; of these, 902 were located in Quebec, 422 in Ontario, 28 in British Columbia and lesser numbers in Nova Scotia, New Brunswick, Manitoba, Saskatchewan and Alberta. Capital employed by the industry totalled \$4,287,789; employees were reported at 3,252; salaries and wages paid totalled \$2,995,526; fuel, electricity and process supplies used aggregated \$474,647, and the total net value of production was estimated at \$9,901,076.

The following is from a report prepared by the Bureau of Mines, Ottawa:

"Deposits of gravel and sand are numerous throughout eastern Canada, with the exception of Prince Edward Island, where gravels are scarce. Owing to the widespread occurrence of gravels and sands and to their bulk in relation to value, local needs for these materials are usually supplied from the nearest deposits, as their cost to the consumer is governed largely by the length of haul. Hence the large number of small pits and the small number of large plants. Some grades of sand particularly suitable for certain industries command a much higher price than does ordinary sand.

"Most of the gravel used for road work comes from pits worked for that purpose. Usually a portable or semi-portable plant is used to extract enough gravel to supply the immediate need and then a sufficient reserve is built up, in the form of stock piles, for two years' requirements. Road pits may remain idle for two years or more. The amount of gravel produced from year to year thus fluctuates, depending on the program of road construction and improvement. Inter-mittent operation also applies to railway pits, which may remain idle for several years.

"Part of the gravel used is crushed, screened and in some cases even washed and the proportion thus processed is increasing steadily. Some Provincial Highway Departments have used crushed instead of pit-run gravel on their main highways for a number of years. Most of the large commercial plants are equipped for producing crushed gravel, a product that can compete with crushed stone.

"The amount of sand consumed follows the trend of building activity, as most of it is used in the building industry for concrete work, cement and lime mortar, or wall plaster. The sand must be clean, that is, free from dust, loam, organic matter or clay, and contain but little silt, and is usually obtainable from local deposits.

"Other important uses of sand are for moulding in foundries, filtering of water supply, and glass making, all of which require special grades of sand.

"War conditions did not materially affect the total consumption of sand and gravel, as the extra amount absorbed by war services is partly if not wholly offset by a decreased activity in ordinary industry due to the war.

"Prices of sand, gravel and crushed stone in the four largest cities in Canada were as follows, at the end of 1940 and 1941. Prices per ton or cubic yards, as indicated below, are for carlots, f.o.b. cars:

	Montreal		Toronto		Winnipeg		Vancouver	
	per ton		per ton		per cu. yd.		per cu. yd.	
	1940	1941	1940	1941	1940	1941	1940	1941
Sand.....	\$ 1.15	\$ 1.15	\$ 0.93	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
Gravel.....	1.10	1.10	1.43	1.53	1.00	1.00	1.00	1.00
Crushed stone.....	0.75	0.82	1.35	1.61			1.13	1.13

"Every province except New Brunswick and Prince Edward Island produces natural bonded moulding sand. One deposit in New Brunswick was operated in 1918 and another in 1921 and 1922. A small production also came from Prince Edward Island of a grade suitable only for light-weight castings. By far the greater part of the output has come from the Niagara peninsula, Ontario. Occasionally new deposits have been opened up, mostly in Ontario and in the western provinces.

"The results of a general investigation of moulding sands in Canada, were published in 1936 by the Bureau of Mines, Ottawa, in the form of report No. 767, "Natural Bonded Moulding Sands of Canada." This report directs attention to the large number of deposits from which supplies have been obtained for local foundries and the probability of replacing imported material with Canadian sands."

Table 313.—Production (*) of Sand and Gravel in Canada, 1932-1941

Year	Tons	-\$	Year	Tons	\$
1932.....	14,469,942	4,480,596	1937.....	27,001,301	10,492,696
1933.....	11,738,820	4,464,285	1938.....	32,223,882	12,002,554
1934.....	14,854,159	4,035,477	1939.....	31,294,341	11,241,102
1935.....	21,213,489	6,389,440	1940 (†).....	31,375,415	11,759,245
1936.....	22,124,160	6,921,399	1941 (xx).....	31,604,806	10,375,723

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these are recorded under quartz. Also does not include natural sand used for back filling at mines prior to 1936.

(xx) Includes 4,751,081 tons valued at \$821,789 produced by railroad companies.

(†) Includes 3,840,844 tons valued at \$660,627 produced by railroad companies.

Table 314.—Production in Canada of Sand and Gravel, by Grades, 1940 and 1941

		Washed or screened	Bank or pit-run	Total value
		Tons	Tons	\$
PRODUCTION (*)	1940			
Sand—				
Moulding sand	17,852	11,750	30,538	
Building sand and sand for concrete, roadwork, etc.	723,864	1,237,740	537,937	
Core sand	2,031	84	3,119	
Mine filling	8,058	1,022,988	150,209	
Other sand (including blast sands, engine sands, etc.)	3,313	48,027	20,395	
Sand and Gravel—				
Sand and gravel for railway ballast	105,175	3,729,729	699,518	
Sand and gravel for concrete, road-building, etc.	2,110,401	19,355,560	9,100,612	
Crushed gravel	619,239	2,379,604	1,216,917	
Total	3,589,933	27,785,482	11,759,245	
Cost of fuel, electricity and process supplies used				291,008
Total net value				11,468,237
PRODUCTION (*)—	1941			
Sand—				
Moulding sand	25,624	12,685	40,066	
Building sand and sand for concrete, roadwork, etc.	1,305,256	887,149	729,901	
Core sand	37,468	72	17,680	
Mine filling		1,363,317	190,504	
Other sand (including blast sands, engine sands, etc.)	7,485	84,533	26,054	
Sand and Gravel—				
Sand and gravel for railway ballast	340,005	4,496,903	916,979	
Sand and gravel for concrete, road-building, etc.	2,194,901	17,574,897	7,135,258	
Crushed gravel	547,687	2,726,823	1,319,281	
Total	4,458,426	27,146,380	10,375,723	
Cost of fuel, electricity and process supplies used				474,647
Total net value				9,901,076

(*) Does not include production of natural silica sand or of silica sand manufactured from quartz or silica rock; production of these is recorded under quartz.

Table 315.—Production of Sand and Gravel in Canada, by Railway Operators, 1940 and 1941

Kind	1940		1941	
	Tons	Value	Tons	Value
		\$		\$
Sand—				
Moulding sand			225	450
Building sand and sand for concrete, roads, etc.	312	40	121	45
Other sand (including blast and engine sands)	44,115	8,951	74,819	15,423
Sand and gravel—				
Sand and gravel for railway ballast	3,574,525	612,492	4,238,565	688,920
Sand and gravel for concrete, roads, etc.	37,132	6,953	304,394	62,309
Crushed gravel	184,760	32,191	132,957	54,642
Total	3,840,844	660,622	4,751,081	821,789

Table 316.—Production of Sand and Gravel in Canada, by Operators, Other Than Railways, 1940 and 1941

Kind	1940			1941		
	Washed or screened	Bank or pit-run	Value	Washed or screened	Bank or pit-run	Value
	Tons	Tons	\$	Tons	Tons	\$
Sand—						
Moulding sand	17,852	11,750	30,538	25,624	12,460	39,616
Buildings and sand for concrete, roads,	723,864	1,237,428	537,897	1,305,256	887,028	729,856
Core sand	2,031	84	3,119	37,468	73	17,680
Other sand (including blast and engine	3,313	3,912	11,444	7,485	9,714	10,631
sands)						
Sand and gravel—						
Sand and gravel for railway ballast	105,175	155,204	87,026	340,005	258,335	228,050
Sand and gravel for concrete, roads, etc.	2,110,401	19,318,428	9,093,659	2,194,901	17,270,503	7,072,949
Mine filling	8,058	1,022,988	150,209		1,363,317	190,504
Crushed gravel	619,239	2,194,844	1,184,726	547,687	2,593,866	1,264,639
Total	3,589,933	23,944,638	11,098,618	4,458,426	22,395,295	9,553,934

Table 317.—Production of Sand for Building and Concrete, Roads, etc., and Sand and Gravel for Railway Ballast and for Concrete, Roads, etc., 1932-1941

Year	Sand		Sand and gravel			
	For building, concrete, roads, etc.		For railway ballast		For concrete, roads, etc.	
	Tons	\$	Tons	\$	Tons	\$
1932.....	2,368,304	745,091	2,097,224	324,648	9,604,113	3,181,105
1933.....	775,412	218,559	561,538	110,449	9,957,832	3,907,911
1934.....	686,631	209,002	1,454,618	266,292	12,418,408	3,411,751
1935.....	787,412	264,435	2,267,195	415,092	17,531,047	5,357,331
1936.....	956,502	362,542	6,318,681	1,054,703	14,336,640	5,216,942
1937.....	1,356,269	476,824	2,764,639	533,876	19,453,188	8,340,764
1938.....	1,750,187	685,976	2,359,703	443,936	22,513,256	9,101,882
1939.....	1,169,899	364,829	3,223,718	603,288	22,899,751	8,988,114
1940.....	1,961,604	537,937	3,834,904	699,518	21,465,961	9,100,612
1941.....						
Nova Scotia.....	121	45	120,284	22,731	530,077	264,286
New Brunswick.....	116,100	27,000	374,179	44,984	471,151	351,016
Quebec.....	924,601	264,497	1,020,762	173,062	7,143,746	1,280,877
Ontario.....	1,013,921	373,113	1,375,695	320,316	7,539,662	3,334,307
Manitoba.....	26,774	11,766	579,703	100,083	859,989	297,880
Saskatchewan.....	11,894	4,312	509,743	106,745	669,710	289,960
Alberta.....	11,467	12,359	233,314	42,692	707,171	377,497
British Columbia.....	87,527	36,809	623,228	106,366	1,848,292	939,435
Canada.....	2,192,405	729,901	4,836,908	916,979	19,769,798	7,135,258

Table 318.—Production of Sand and Gravel in Canada, by Provinces, 1941

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Sand—								
Moulding sand..... tons	825			36,599	797	25	60	
..... \$	2,435			36,599	874	63	95	
Building sand and sand for concrete, roadwork, etc..... tons	121	116,100	924,601	1,013,921	26,774	11,894	11,467	87,527
..... \$	45	27,000	264,497	373,113	11,766	4,312	12,359	36,809
Core sand..... tons			24,159	13,369			73	
..... \$			8,455	9,117			108	
Other sand (including blast sand, engine sand, etc.)..... tons		1,055	29,904	23,008	4,860	28,288	4,399	506
..... \$		772	6,278	10,736	2,160	5,000	753	355
Sand and gravel—								
Sand and gravel for railway ballast..... tons	120,284	374,179	1,020,762	1,375,695	579,703	509,743	233,314	623,228
..... \$	22,731	44,984	173,062	320,316	100,083	106,745	42,692	106,366
Sand and gravel for concrete, roads, etc..... tons	530,077	471,151	7,143,746	7,539,662	859,989	669,710	707,171	1,848,292
..... \$	264,286	351,016	1,280,877	3,334,307	297,880	289,960	377,497	939,435
Mine filling..... tons				1,032,501		574		330,242
..... \$				165,914		128		24,462
Crushed gravel..... tons	98,134		2,538,218	534,687	31,778	564		71,129
..... \$	43,034		940,131	274,361	17,233	627		43,895
Total..... tons	749,441	962,483	11,681,390	11,569,382	1,503,901	1,220,801	956,484	2,960,924
Gross value..... \$	332,531	423,772	2,673,300	4,524,463	429,996	406,835	433,504	1,151,322

Table 319.—Capital Employed in the Sand and Gravel Industry in Canada, by Provinces, 1941

	Capital employed as represented by:					
	Present cash value of the land*	Present value of buildings, fixtures, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	\$	\$	\$	\$	\$	\$
Nova Scotia.....	10,320	(a)	(a)	(a)	(a)	10,320
New Brunswick.....	5,000	(a)	(a)	(a)	(a)	5,000
Quebec.....	69,150	70,283	115,290	108	10,616	265,447
Ontario†.....	294,843	1,086,125	42,837	47,643	797,921	2,269,369
Manitoba.....	383,699	173,101	52,962	2,806	226,606	839,174
Saskatchewan.....	5,300	84,504	.....	.....	197,968	287,772
Alberta.....	600	24,688	500	7,500	17,196	50,484
British Columbia.....	111,447	366,862	1,548	3,687	76,679	560,223
Canada.....	880,359	1,895,563	213,137	61,744	1,326,986	4,287,789

* Excluding unmined materials.

(a) Not available.

† Includes value of dredges.

Table 340.—Employees, Salaries and Wages in the Sand and Gravel Industry, by Provinces, 1941

Province	Average number of employees			Salaries and wages		
	Salaried employees	Wage-earners	Total	Salaries	Wages	Total
				\$	\$	\$
Nova Scotia.....	.....	579	579	.....	257,045	257,045
New Brunswick.....	.....	393	393	.....	202,926	202,926
Quebec.....	22	906	928	18,042	947,596	965,638
Ontario.....	35	420	455	66,117	465,902	532,019
Manitoba.....	25	294	319	63,293	330,658	393,951
Saskatchewan.....	5	124	129	16,384	132,928	149,312
Alberta.....	4	261	265	16,050	260,109	276,159
British Columbia.....	18	166	184	34,954	183,522	218,476
Canada.....	109	3,143	3,252	214,840	2,780,686	2,995,526

Table 341.—Average Number of Wage-Earners in the Sand and Gravel Industry, by Months, 1940-1941

	1940	1941
January.....	274	450
February.....	268	440
March.....	346	517
April.....	629	815
May.....	3,275	4,400
June.....	8,182	8,493
July.....	11,504	8,023
August.....	11,526	7,225
September.....	8,644	3,421
October.....	3,372	2,570
November.....	886	764
December.....	628	412

THE STONE INDUSTRY IN CANADA

The Stone Industry in Canada comprises two main divisions: 1. THE STONE QUARRYING INDUSTRY, including quarries and dressing works operated in conjunction with quarries, and 2. THE STONE PRODUCTS INDUSTRY, comprising the operations of firms having no quarries but who operate dressing works where stone for building and monumental purposes is cut, polished or otherwise finished. In the Census of Industry, statistics on the stone quarrying industry are included under mining, while statistics of the stone products industry are included under manufactures. For convenience this report carries data for both of these industries.

These two major divisions, constituting the Canadian stone industry, represented a capital investment of \$15,459,244 in 1941. Production during the year totalled \$10,640,167 which figure includes the value of the quarry output and the value added by manufacturing in the secondary

stone industry. Salaried employees and wage-earners employed in 1941 numbered 3,745 and their combined earnings amounted to \$4,192,634.

The two industries are treated separately in the following review:

1. Primary Production—The Stone Quarrying Industry

The kinds of stone quarried in Canada include granite (trap rock, syenite and other igneous rock), limestone, marble, sandstone, and slate. Stone of almost every known variety occurs in Canada; rocks of the igneous areas of British Columbia, Manitoba, Ontario, Quebec and the Maritime Provinces exhibit a wide range of physical characteristics, some varieties being especially noted for their richness of colour and beauty of crystallization. The sedimentary rocks, including limestones, sandstones and marbles are quarried at various points in Canada. The products from quarries operating in these different formations not only yield high class structural and decorative materials but provide the chemical and other allied industries with many of their increasing requirements.

The gross value of all varieties of stone produced in Canada during 1941 totalled \$8,000,684 compared with \$7,398,959 in 1940. Comprising the tonnage shipped in 1941 were 600,922 tons of granite valued at \$1,498,786; 7,151,049 tons of limestone at \$6,057,727; 17,649 tons of marble at \$126,081; 169,885 tons of sandstone at \$305,528 and 1,296 tons of slate worth \$12,562. Of the total value of domestic stone sold in 1941, that of Quebec shipments amounted to 45.1 per cent; Ontario, 41.0 per cent, and British Columbia, 5.1 per cent.

The number of firms in the stone quarrying industry reported as active in 1941 totalled 457; capital employed amounted to \$11,162,036; employees numbered 2,758; salaries and wages paid aggregated \$2,896,100 and the cost of fuel, electricity and process supplies used was reported at \$1,283,183.

Data relating to Canadian imports and exports of stone have not been released for publication since 1939, and any requests for such information should be addressed to the External Trade Branch of the Dominion Bureau of Statistics, Ottawa.

Table 342.—Production (Sales) of Stone from Canadian Quarries, by Kinds and by Provinces, 1940 and 1941

Province	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
1940						
Nova Scotia..... tons	87,975	24,160		69,316		181,451
	\$ 155,458	46,717		111,469		313,644
New Brunswick..... tons	1,326	159,812		5,015		166,153
	\$ 69,833	206,916		33,550		310,299
Quebec..... tons	366,662	2,287,384	8,767	92,378	639	2,755,830
	\$ 792,708	1,854,423	50,652	129,179	639	2,827,601
Ontario..... tons	529,440	3,302,596	4,792	3,446		3,840,271
	\$ 704,421	2,649,809	22,157	11,008		3,387,395
Manitoba..... tons	218	48,488				48,706
	\$ 4,324	74,116				78,440
Alberta..... tons		3,981				3,981
	\$	11,999				11,999
British Columbia..... tons	162,126	282,170	180	6,320	474	451,270
	\$ 157,666	282,095	2,600	20,337	6,883	469,581
Canada..... tons	1,147,747	6,108,591	13,739	176,475	1,113	7,447,665
	\$ 1,884,410	5,126,075	75,409	305,543	7,522	7,398,959
1941						
Nova Scotia..... tons	410	46,973		66,219		113,602
	\$ 30,537	69,501		169,307		269,345
New Brunswick..... tons	1,529	131,941		4,678		138,148
	\$ 63,184	274,000		10,680		347,864
Quebec..... tons	316,372	3,370,875	10,809	76,928	346	3,775,330
	\$ 856,182	2,567,422	92,916	82,701	346	3,609,567
Ontario..... tons	152,426	3,353,856	6,540	13,420		3,526,242
	\$ 388,325	2,832,056	30,365	27,190		3,277,936
Manitoba..... tons	244	38,103				38,347
	\$ 4,155	60,743				64,898
Alberta..... tons		7,942				7,942
	\$	24,303				24,303
British Columbia..... tons	129,941	201,359	300	8,640	950	341,190
	\$ 146,403	229,702	2,800	15,650	12,216	406,771
Canada..... tons	600,922	7,151,049	17,649	169,885	1,296	7,940,801
	\$ 1,498,786	6,057,727	126,081	305,528	12,562	8,000,684

(a) All igneous rocks included.

(b) Includes dolomite, also marl for agricultural purposes.

Note.—Not included in the above limestone statistics are 1,765,944 tons of limestone consumed in the cement industry in 1940 and 2,086,781 tons in 1941. Limestone used in the Canadian lime industry is also not included; it is estimated that approximately 1,280,949 tons of limestone were burned in the manufacture of lime in 1940 and 1,530,200 tons in 1941.

Table 343.—Production (Sales) of Stone from Canadian Quarries by Provinces, Showing Purposes for Which Used, 1941 (*)

For use as follows;	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
1941								
Building stone—Rough.....tons	600	962	8,611	9,355	111		600	20,239
\$	3,600	1,680	21,192	29,358	2,595		2,000	60,425
Dressed.....tons		120	22,461	9,881	972		589	34,023
\$		5,880	466,048	61,435	16,822		42,467	592,652
Monumental and ornamental stone—Rough.....tons	80	161	6,022	172			997	7,432
\$	800	5,220	63,057	2,812			10,416	82,305
Dressed.....tons	330	406	4,149	30	40		42	4,997
\$	29,737	56,284	199,119	768	1,647		6,827	294,382
Flagstone.....tons		58	47	2,333	98			2,536
\$		700	106	7,089	540			8,435
Curbstone.....tons			3,379	101				3,480
\$			14,483	245				14,732
Paving blocks.....tons			2,106					2,106
\$			16,931					16,931
Lining open-hearth furnaces.....tons				29,124				29,124
\$				20,893				20,893
Chemical—								
Flux in iron and steel furnaces.....tons			1,234	246,973	5,414	741	636	254,993
\$			1,164	209,372	9,242	1,623	1,515	222,916
Flux in non-ferrous smelters.....tons			1,135	193,498			81,285	275,918
\$			2,041	127,468			49,034	178,543
Glass factories.....tons			899			2,605		3,504
\$			3,428			3,256		6,684
Pulp and paper mills.....tons	3,624	5,670	128,986	47,032	1,763		53,290	240,365
\$	14,636	10,500	144,646	44,494	1,978		89,437	305,691
Sugar refineries.....tons		30			6,189			6,219
\$		120			7,904			8,024
Other chemical uses.....tons				183,692			994	184,686
\$				167,120			596	167,716
Pulverized Stone—								
Whiting (substitute).....tons				5,315			166	5,481
\$				30,107			1,800	31,907
Asphalt filler.....tons	279		16,054	7,649			209	24,191
\$	1,674		48,824	22,082			1,604	74,184
Dusting coal mines.....tons						1,443	451	1,894
\$						5,772	2,700	8,472
Agricultural purposes and fertilizer plants.....tons	13,070	60,545	120,531	17,066	1,708		4,217	217,137
\$	29,191	213,700	157,861	34,875	6,832		11,929	454,388
Other uses.....tons			237	7,151	6,030	80	210	13,708
\$			1,167	32,395	5,683	320	1,980	41,545
Crushed stone for manufacture of artificial stone.....tons			385	477				862
\$			1,796	1,915				3,711
Roofing granules.....tons		537		14,624			887	16,048
\$		1,880		143,853			11,712	157,445
Poultry grit.....tons		74	477	2,371	1,041	1,365	781	6,109
\$		740	1,602	11,877	1,987	6,500	4,690	27,396
Stucco dash.....tons			1,112	150	86		2,766	4,111
\$			6,918	800	378		15,995	24,091
Terrazzo chips.....tons			2,796	2,231				5,027
\$			16,467	12,270				28,737
Rock wool.....tons				8,313				8,313
\$				8,339				8,339
Rubble and riprap.....tons	4,730	16,029	432,091	41,528	530		86,681	581,589
\$	5,484	9,937	254,385	33,321	725		63,321	367,173
Crushed stone—								
Concrete aggregate.....tons	44,889		1,873,809	662,885				2,581,583
\$	112,223		1,335,458	538,545				1,986,226
Road metal.....tons	46,000	53,556	1,062,551	1,682,063	14,894		99,549	2,958,613
\$	72,000	41,223	782,356	1,492,642	14,264		81,908	2,484,393
Railroad ballast.....tons			86,258	352,228	1,179		6,840	446,505
\$			70,518	243,857	1,133		6,840	322,348
Total Canada.....tons	113,602	138,148	3,775,330	3,526,242	38,347	7,942	341,190	7,940,891
 \$	269,345	347,864	3,609,567	3,277,936	64,898	24,303	406,771	8,000,684
Per cent of total.....Quantity	1.43	1.74	47.54	44.41	0.48	0.10	4.30	100.00
Value	3.37	4.35	45.11	40.98	0.81	0.30	5.08	100.00

(*) Includes the production of slate and marl.

Table 344.—Production (Sales) of Stone from Canadian Quarries, by Kinds, Showing Purposes for Which Used, 1941

For use as follows:	Granite (a)	Limestone (b)	Marble	Sandstone	Slate	Total
1941						
Building stone—Rough..... tons	2,589	15,087	61	1,902		20,239
..... \$	11,248	30,557	3,036	9,584		60,425
Dressed..... tons	13,772	19,455	422	374		34,023
..... \$	284,803	241,298	51,535	15,016		592,652
Monuments and ornamental stone—						
Rough..... tons	7,260	148	24			7,432
..... \$	81,073	434	798			82,305
Dressed..... tons	4,925	52		20		4,997
..... \$	291,643	2,359		400		294,382
Flagstone..... tons	150	1,459		927		2,536
..... \$	336	2,625		5,474		8,435
Curbstone..... tons	3,379	70		31		3,480
..... \$	14,483	42		207		14,732
Paving blocks..... tons	2,106					2,106
..... \$	16,951					16,931
Lining open-hearth furnaces..... tons		29,124				29,124
..... \$		20,833				20,893
Chemical—						
Flux in iron and steel furnaces..... tons		254,998				254,998
..... \$		222,916				222,916
Flux in non-ferrous smelters..... tons		275,918				275,918
..... \$		178,543				178,543
Glass factories..... tons		2,605	899			3,504
..... \$		3,256	3,428			6,684
Pulp and paper mills..... tons		240,031	334			240,365
..... \$		305,023	668			305,691
Sugar refineries..... tons		6,219				6,219
..... \$		8,024				8,024
Other chemical uses..... tons		184,686				184,686
..... \$		167,716				167,716
Pulverized Stone—						
Whiting (substitute)..... tons		5,481				5,481
..... \$		31,907				31,907
Asphalt filler..... tons	425	18,463	5,240		63	24,191
..... \$	1,635	62,089	9,956		504	74,184
Dusting coal mines..... tons		1,894				1,894
..... \$		8,472				8,472
Agricultural purposes and fertilizer plants..... tons		216,657	480			217,137
..... \$		453,548	840			454,388
Other uses..... tons		12,871	837			13,708
..... \$		37,278	4,267			41,545
Crushed stone for manufacture of artificial stone..... tons			882			862
..... \$			3,711			3,711
Roofing granules..... tons	14,274	887			887	16,048
..... \$	143,328	2,405			11,712	157,445
Poultry grit..... tons	2	3,912	2,195			6,109
..... \$	90	16,397	10,909			27,396
Stucco dash..... tons	5	2,697	1,412			4,114
..... \$	115	14,958	9,018			24,091
Terrazzo chips..... tons		896	4,131			5,027
..... \$		2,688	26,049			28,737
Rock wool..... tons		8,313				8,313
..... \$		8,330				8,339
Rubble and riprap..... tons	118,328	414,827	410	47,678	346	581,589
..... \$	85,212	232,741	1,638	47,236	346	367,173
Crushed stone—						
Concrete aggregate..... tons	178,611	2,350,850		52,122		2,581,583
..... \$	214,956	1,648,057		123,213		1,986,226
Road metal..... tons	254,171	2,647,797	342	56,303		2,958,613
..... \$	352,378	2,038,208	228	93,579		2,484,393
Railroad ballast..... tons	925	435,052		10,528		446,505
..... \$	555	310,974		10,819		322,348
Total Canada (b) tons	609,922	7,151,049	17,649	169,885	1,296	7,940,891
..... \$	1,498,786	6,057,727	126,081	305,528	12,562	8,000,684

(a) Includes all igneous rock.

(b) Does not include limestone used in Canadian lime and cement industries, but includes marl used for agricultural purposes.

GRANITE

"The stone quarried in this industry consists of granite and related crystalline igneous rocks used for building, decorative, ornamental, or constructional purposes. Producing properties are situated in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, and British Columbia. Large areas in Canada are underlain by granite, and the prospects of finding stone suitable for its various uses are good.

"Much of the granite produced in Canada is used for foundations for highways; for the permanent ballasting of railway roadbeds; for heavy aggregate in large concrete structures; for the filling of breakwaters; and for bridge piers. The marked curtailment of such operations during the past several years has seriously affected production. Production is still far below the record years.

"Granite for monumental use is produced in the Maritime Provinces and in Quebec, Ontario, Manitoba, and British Columbia, and is finding a small but steadily increasing market. Black granite has been quarried in Canada, notably in the vicinity of Lake St. John, Quebec, and from quarries along the north shore of Lake Superior, and stone from these areas should find a ready market for monumental use. Other deposits of black granite in the Maritime Provinces, Quebec, Ontario, and Manitoba show promise of yielding stone of good quality.

"Now that shipments from the Scandinavian countries to the United States and to Canada have been discontinued, Canadian producers would be well advised to give careful study to the market possibilities of a monumental stock, especially for the black and red varieties.

"In the building trade, coloured granites are being used to an increasing extent in the form of thin polished slabs for trim for buildings in which the main colour scheme calls for contrast.

"Canadian granites are suitable for all the purposes for which granite is used, and with persistent advertising there is no reason why this industry should not have a flourishing future." (Bureau of Mines, Ottawa).

Table 345.—Production of Granite (*) in Canada, 1932-1941

Year	Short tons	\$	Year	Short tons	\$
1932.....	490,822	1,110,582	1937.....	1,135,099	1,827,433
1933.....	256,723	679,585	1938.....	705,307	1,379,417
1934.....	200,285	781,739	1939.....	1,102,395	2,119,501
1935.....	326,354	1,126,287	1940.....	1,147,747	1,884,410
1936.....	941,743	1,319,313	1941.....	600,922	1,498,785

(*) Includes all igneous rock.

LIMESTONE

"Limestone in blocks of large dimensions for sawing into building stone is quarried in Quebec, Ontario, and Manitoba. In Quebec, quarries at St. Marc des Carrières, Portneuf county, produce grey limestone, and several in and near Montreal yield limestone of similar colour. In Ontario, a large quarry near Queenston in the Niagara peninsula yields silver-grey limestone as well as small quantities of buff and of variegated buff and grey. At Longford Mills, near Orillia, buff, silver-grey, and brown limestone for use both as marble and as building stone is available, but has not been quarried for the past several years. The Manitoba quarries are near Tyndall and yield mottled buff, mottled grey and mottled variegated limestone. Besides these large quarries, the products of which have a wide shipping range, small quarries producing building stone for local use are worked near Quebec City, Montreal, and Hull in Quebec; and at Ottawa, Kingston, Erin, and Warton in Ontario. Rubble is their chief product.

"Some of the quarry companies market stone in all stages of manufacture, from the mill block to elaborately carved material; others sell stone only in the mill block. Waste material is utilized for crushed stone, rubble, riprap, flagging, chemical and metallurgical purposes, and for lime manufacture.

"There were no developments of importance in 1941. Although building construction is very active owing to defence needs, most of the buildings are of the factory type and require little cut stone; thus, the building-stone industry is relatively inactive and a number of the quarries are either shut down or operated only for a short time each year.

"The limestone deposits being worked for building stone are favourably situated in respect to centres of population and the supply of stone is adequate for present and future demands.

"Prices of limestone in the mill block f.o.b. quarry have remained almost stationary in recent years, and range from 50 cents to \$1 per cubic foot, depending on the size of block and grade of stone.

"Limestone is available in great bedded formations and in massive highly metamorphosed deposits—the former being much more common and yielding most of the production. At present, almost all Canadian limestone is won by open pit methods, though underground mining of the rock has been adopted by several companies producing limestone for chemical and metallurgical uses and for making lime. Underground mining will undoubtedly become more common, particularly for the production of high-grade stone for chemical use, as the readily accessible parts of deposits become worked out.

"Of significance in connection with future production of pure limestone is the progress being made in beneficiation, whereby siliceous material is in part removed from limestone by flotation. This method of purifying limestone is now in use at several Portland cement plants in various parts of the world.

"Limestone is widely distributed and is quarried on a large scale in all industrial countries. Rarely is there any considerable international trade in it, but, because foreign limestone can be obtained more cheaply at certain large consuming centres in Canada than the domestic, considerable quantities are imported from the United States and Newfoundland for use as blast furnace flux, and from the United States alone for road metal, and for use in some pulp mills in Ontario near the International Boundary. Comparatively small tonnages are exported to the United States for use in agriculture and in sugar refineries. No separate record is maintained of the trade in limestone.

"For domestic use, limestone is marketed in a variety of forms ranging from huge squared blocks of dimension stone used in construction, to extremely fine dust used chiefly as a mineral filler. Some of the products are processed but little if at all from the condition in which the rock is obtained from the quarry, as for example limestone used in the wood pulp industry, but the bulk of the output is crushed and screened for use as road metal, concrete aggregate, railroad ballast, and as flux in metallurgical plants. Large quantities are used in the manufacture of Portland cement, lime, and various chemical products. Argillaceous dolomite is used in the manufacture of rock wool. This industry is steadily expanding in Canada and in 1941 its output was valued at well over \$1,000,000. Pure dolomite is assuming a position of importance as a raw material for the manufacture of magnesium metal. A process has been developed to extract magnesium directly from calcined dolomite, and a plant employing this process is now under construction in Ontario. Calcined dolomite is also used in other countries to precipitate magnesia from sea water and magnesium chloride brines—the magnesia so obtained being used either for the manufacture of magnesium metal or for refractory materials. A present use for limestone, capable of enormous development, is in agriculture. Though the necessity of applying limestone or lime to agricultural land in order to maintain or increase soil fertility has been emphasized for many years by authorities on agriculture, the quantity so used in Canada is still very small, whereas if the proper quantity were applied it would constitute one of the principal outlets for limestone." (Bureau of Mines, Ottawa).

Table 346.—Production of Limestone in Canada, 1932-1941

Year	Short tons	\$	Year	Short tons	\$
1932.....	3,687,241	3,227,715	1937.....	5,542,806	4,673,942
1933.....	2,572,911	2,142,516	1938.....	4,288,507	3,864,619
1934.....	3,747,779	3,157,832	1939.....	4,149,589	3,817,551
1935.....	3,631,665	3,253,573	1940.....	6,108,591	5,126,075
1936.....	3,731,548	3,143,872	1941.....	7,151,049	6,057,727

MARBLE

"Marble quarries are operated in the provinces of Quebec, Ontario, Manitoba, and British Columbia. The products include squared blocks for sawing into slabs and for making monuments, and broken marble for rubble and for making terrazzo, stucco dash, whiting substitute, marble flour and artificial stone. Waste from some of the quarries is sold for chemical uses and for road metal.

"In Quebec, several varieties of clouded grey marble and also a black marble are quarried at Philipsburg by Missisquoi Stone and Marble Company, Limited. Some brown marble used for counters and wainscoting is obtained from the building stone quarries in the Trenton limestones

at St. Marc des Carrières, Portneuf county. Dolomitic white marble is quarried and crushed by White Grit Company at Portage de Fort, Pontiac county, and by Canada Marble and Lime Company at l'Annonciation, Labelle county, for the making of terrazzo chips, stucco dash, poultry grit, artificial stone, and for chemical and ceramic uses. A small quantity of dark red marble has been quarried at Cap St. Martin near Montreal, chiefly for making tombstones.

"In Ontario, black marble is quarried at St. Albert, near Ottawa, by Silvertone Black Marble Quarries, Limited. Recently a 40-inch bed of marble was uncovered in this quarry which, because of its soundness and uniformity, is suitable for making large monolithic pillars. White marble is quarried at Marmora by Bonter Marble and Calcium Company, Limited, and at Haliburton by Bolender Brothers for making terrazzo chips, poultry grit, stucco dash, and artificial stone. Buff, red, white, green, and black marbles are quarried north of Madoc by Karl Stocklosar and by Connolly Marble, Mosaic and Tile Company, Limited for use as terrazzo.

"In Manitoba, a number of highly coloured marbles are available, but there is only a small production to supply terrazzo chips and building rubble.

"In Alberta, a deposit of calcareous tufa near Radnor station on the Canadian Pacific Railway has been quarried for terrazzo and a small quantity has also been marketed in block form.

"In British Columbia there are many deposits of marble, but there is only a small production of white marble near Victoria and on Texada Island for use as terrazzo, poultry grit, marble sand, and whiting substitute.

"Many known deposits of beautifully coloured marbles have never been fully investigated, chiefly because the present demand in Canada for marble of any one colour, other than for a staple variety, such as white, is comparatively small.

"The war has adversely affected the Canadian marble industry, for though construction activity is again at a high level, most of the buildings erected are of the industrial type in which little or no standing marble is used.

"The Canadian market calls for interior decorative marble almost entirely, and very little is used for tombstones. In recent years there has been an increasing demand for marble in the form of terrazzo for flooring, and many inquiries have reached the Bureau of Mines, Ottawa, as to where marbles of various colours can be obtained." (Bureau of Mines, Ottawa).

Table 347.—Production of Marble in Canada, 1932-1941

Year	Short tons	\$	Year	Short tons	\$
1932.....	12,379	250,706	1937.....	21,642	88,595
1933.....	10,897	65,913	1938.....	19,375	87,274
1934.....	13,783	69,475	1939.....	14,124	200,054
1935.....	15,975	85,369	1940.....	13,739	75,409
1936.....	22,866	169,698	1941.....	17,649	126,081

SANDSTONE

Canadian sandstone has been utilized extensively in the construction of many important public buildings in Canada and is finding increasing favour as a material in the construction of the better type home. The rock occurs in Canada in a variety of colours, including white, reddish brown, yellow and grey. Shipments of sandstone were made in 1941 from quarries located in all of the provinces with the exception of Prince Edward Island, Manitoba and Saskatchewan.

The greater part of the crude output in 1941 was employed as rubble and riprap and in the crushed state for concrete, highway construction and railroad ballasting. Sandstone in British Columbia, New Brunswick and Nova Scotia has been employed in the manufacture of abrasive wheels and sharpening stones; such production is included with natural abrasives manufacture.

Table 348.—Production of Sandstone in Canada, 1932-1941

Year	Short tons	\$	Year	Short tons	\$
1932.....	500,480	349,458	1937.....	235,165	343,871
1933.....	99,043	108,562	1938.....	101,854	218,405
1934.....	115,169	143,283	1939.....	176,265	331,830
1935.....	342,824	838,005	1940.....	176,475	305,543
1936.....	285,508	495,856	1941.....	169,885	305,528

SLATE

Canadian slate production in 1941 came entirely from the provinces of Quebec and British Columbia and represented shipments of the stone in the form of granules for roofing purposes, riprap and asphalt filling. No Canadian deposits of slate suitable for the production of high grade roofing slates or shingles have been reported as being under development in recent years.

Table 349.—Production of Slate in Canada, 1932-1941

Year	Short tons	\$	Year	Short tons	\$
1932.....	250	3,750	1937.....	900	5,519
1933.....	250	3,750	1938.....	1,979	6,311
1934.....	738	4,802	1939.....	1,149	6,760
1935.....	1,129	4,329	1940.....	1,113	7,522
1936.....	1,247	5,414	1941.....	1,296	12,562

Table 350.—Production of Stone for Building Purposes, Chemical Use, Cement Manufacture, Concrete Aggregate, Road Metal and Railroad Ballast, 1934-1941

	Building stone (a)	For chemical purposes (b)	For concrete aggregate	For road metal	For railroad ballast	For cement manufacture
1934.....	52,665 \$ 490,095	489,580 447,429	821,099 608,240	2,062,487 1,668,927	345,802 209,296	803,546 818,443
1935.....	200,899 \$ 1,258,741	537,799 483,709	804,719 523,847	1,976,363 1,987,351	351,302 211,993	.....
1936.....	42,335 \$ 714,616	615,207 553,597	1,014,145 730,617	1,903,927 1,653,134	784,081 659,656	1,180,358 (c) 1,465,168
1937.....	49,098 \$ 746,370	693,947 626,297	1,497,655 821,739	3,169,136 2,721,922	642,248 85,019	(d) 1,358,689
1938.....	49,666 \$ 725,402	551,737 468,000	791,971 1,214,181	2,347,010 2,522,080	58,816 600,266	(d) 1,407,099
1939.....	71,288 \$ 1,334,340	577,278 523,579	1,344,636 1,109,028	2,131,306 1,773,337	522,882 896,408	(d) 1,784,291
1940.....	97,336 \$ 722,514	725,685 681,796	2,673,078 2,171,487	2,300,613 1,885,744	741,772 446,505	(d) 2,113,618
1941.....	54,262 \$ 653,077	965,690 889,574	2,581,583 1,986,226	2,958,613 2,484,393	322,348.....	.....

(a) Does not include monumental or ornamental stone.

(b) Does not include limestone used in Canadian lime industry.

(c) Includes shale.

(d) Includes 13,821 tons shale in 1938, 27,241 tons in 1939, 18,347 in 1940 and 26,837 in 1941.

WHITING SUBSTITUTE

(Bureau of Mines, Ottawa)

"Whiting substitute, as the name implies, is a material that may be used in place of chalk whiting, all of which originates in England or in Europe. It may be made from white limestone or white marble, marl, lime, or the waste calcium carbonate sludge resulting from the manufacture of caustic soda.

"The principal differences between whiting made from chalk, and whiting substitute made from marble or limestone are that the latter is usually whiter, has a low capacity for absorbing oil, and the individual particles are sub-angular rather than rounded.

"The products made from white marble or white limestone are pulverized to various degrees of fineness ranging from 200 to 400 mesh; and the raw material used contains very little magnesium carbonate, though in the past a whiting substitute made from white dolomite was produced in Eastern Canada for making putty.

"Marl suitable for making whiting substitute should be white or nearly so, be nearly free from grit and clayey material, and have a very low content of organic matter. This last-named constituent, which is present to some extent in all deposits of marl, renders the product unsuitable for use as a filler in products such as putty and paint where it will come in contact with oils. The oil-absorptive capacity of whiting substitute made from marl is usually greater than that of whiting, but in other respects the physical characteristics of the two products are much the same.

"Calcium carbonate filler, a product closely akin to whiting substitute and made by introducing carbon dioxide gas into milk-of-lime made from high-calcium quicklime, has been produced in Canada for the past several years. Its use up to the present has been as a filler in newsprint, book, and magazine paper, and its manufacture has been undertaken by the paper companies using it.

"By-product precipitated chalk, made from waste sludge resulting from the manufacture of caustic soda from soda ash and lime, is classed as a whiting substitute, but its usefulness is restricted by the fact that it almost invariably contains a small amount of free alkali. The raw materials for the manufacture of by-product precipitated chalk are available but it is not yet being made in Canada.

"Producers of whiting substitutes are Pulverized Products, Limited, Montreal; Claxton Manufacturing Company, Toronto; White Valley Chemicals, Limited, Toronto; Gypsum, Lime and Alabastine, Canada, Limited, Winnipeg; and Beale Quarries, Limited, Van Anda, Texada Island, British Columbia.

"Whiting substitute made in Canada is used mostly in the manufacture of oilcloth, linoleum, in certain kinds of rubber products, in putty, in explosives, and as a filler in newsprint, book, and magazine paper. In lesser quantities it is used in the manufacture of moulded articles, cleaning compounds and polishes, as a ceramic glaze and for a number of other purposes.

Prices per ton, bagged and in carload lots range from \$8.00 to \$15.00 per ton f.o.b. plants."

Table 351.—Consumption of Whiting, (and Chalk), by Uses, as Reported to the Annual Census of Industry, 1940 and 1941

Industry	1940		1941	
	Tons	Cost at works	Tons	Cost at works
		\$		\$
Paints and pigments.....	7,378	165,162	7,833	203,547
Rubber.....	6,817	106,119	7,619	126,312
Miscellaneous textiles*.....	1,151	16,404	1,191	19,690
Explosives (a).....	290	2,102		
Toilet preparations (a).....	67	7,277	109	11,874

* Includes oilcloth and linoleum.

(a) Chalk, ground and precipitated.

Table 352.—Employees, Salaries and Wages, Specified Costs and Net Values, in the Stone Industry in Canada, by Provinces, 1941

Province	Firms	Average number of employees			Salaries and wages		Cost of fuel, electricity and process supplies used	Net value of production
		Salaried employees		Wage-earners	Salaries	Wages		
		No.	Male					
Nova Scotia.....	40	6		96	13,225	75,372	25,611	243,734
New Brunswick.....	11	11		3	111	15,905	104,579	330,259
Quebec.....	203	142		22	1,388	204,487	1,249,153	2,990,694
Ontario.....	170	73		13	681	180,858	814,227	2,705,110
Manitoba.....	5	6			20	7,919	18,414	50,567
Alberta.....	2	(a)		(a)	(a)	(a)	(a)	24,303
British Columbia.....	26	15		2	169	22,745	189,216	372,834
Canada.....	457	253		40	2,465	445,139	2,450,961	6,717,501

(a) Data not available.

Table 353.—Capital Employed in the Stone Quarrying Industry of Canada, by Provinces, 1941

—	Plants	Capital employed as represented by:					
		Present cash value of the land *	Present value of buildings, fixtures, machinery, tools and other equipment	Inventory value of materials on hand, stocks in process, fuel and miscellaneous supplies on hand	Inventory value of finished products on hand	Operating capital (cash, bills and accounts receivable, prepaid expenses, etc.)	Total
	No.	\$	\$	\$	\$	\$	\$
Nova Scotia.....	41	22,641	109,129	5,592	7,328	34,277	178,967
New Brunswick.....	11	41,200	71,898	8,143	8,110	114,109	243,460
Quebec.....	224	1,170,402	2,631,063	305,114	202,074	958,946	5,267,599
Ontario.....	174	1,549,376	1,968,365	115,880	151,758	650,029	4,435,408
Manitoba.....	6	45,590	267,161	16,194	340	62,585	391,870
Alberta.....	2	(a)	(a)	(a)	(a)	(a)	(a)
British Columbia..	81	78,145	455,164	13,762	18,229	79,432	644,732
Canada.....	539	2,907,354	5,502,780	464,685	387,839	1,899,378	11,162,036

* Excluding unmined materials. (a) Not available.

Table 354.—Average Number of Wage-Earners, by Months, 1940 and 1941

Month	1940	1941		Month	1940	1941	
		Quarry	Dressing works			Quarry	Dressing works
January.....	1,015	1,016	203	July.....	3,861	2,742	448
February.....	1,195	1,036	234	August.....	3,998	2,775	552
March.....	1,309	1,050	269	September.....	3,619	2,702	555
April.....	2,023	1,712	333	October.....	3,205	2,603	543
May.....	2,903	2,490	442	November.....	2,776	2,231	432
June.....	3,212	2,575	449	December.....	1,937	1,703	309

2. SECONDARY PRODUCTION**THE STONE PRODUCTS INDUSTRY**

In 1941 there were 174 stone dressing works whose operations were reported separately from the quarries. These plants were engaged chiefly in cutting or polishing Canadian or imported stone to produce finished monuments or cut and dressed stone for construction purposes. Retail establishments engaged only in selling and lettering monuments have not been included. Five producers of rock wool were also included in this industry.

Output from this industry was valued at \$3,883,496 in 1941, an increase of 8.1 per cent over the total of \$3,592,623 reported for the previous year. The 78 works in Ontario accounted for 63.8 per cent of the total output and the 40 plants in Quebec for 19.6 per cent. The average number of employees was 987 and \$1,296,534 were paid in salaries and wages. Materials used in the cutting and dressing processes, including stone, cost \$1,244,013 and expenditures for fuel and electricity amounted to \$137,842.

Table 355.—Cost of Materials Used in the Stone Products Industry, 1940 and 1941

	Cost at works	
	1940	1941
	\$	\$
Stone—(a) From Canadian quarries.....	380,650	373,780
(b) Imported.....	235,872	185,162
Monuments, cut and polished, for lettering only.....	99,114	73,799
All other materials.....	467,476	611,272
Total.....	1,183,112	1,244,013

Table 356.—Production from the Stone Products Industry, by Provinces, 1940 and 1941

	Granite		Marble		Marble chips and dust	Limestone		Finished monuments, lettered only	Other products	Total
	Monuments	For building purposes	Monuments	For building purposes		Monuments and bases	For building purposes			
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Prince Edward Island and New Brunswick—										
1940.....	61,634	3,575	13,081			1,430		6,381	700	86,801
1941.....	73,588	770	14,411			1,500		2,260	2,793	95,322
Nova Scotia—										
1940.....	63,013	2,846	11,334			75		26,291	1,630	105,189
1941.....	44,870	930	10,344			1,065		38,172	7,505	102,886
Quebec—										
1940.....	332,685	109,680	9,892	116,835	4,442	7,240	45,047	9,710	242,344	877,875
1941.....	335,936	35,332	5,639	57,565	7,862	4,389	22,972	9,133	283,053	761,881
Ontario—										
1940.....	738,932	8,159	75,740	79,305	324	7,480	391,835	50,407	748,965	2,101,147
1941.....	881,220	25,150	85,337	73,164	2,170	15,795	359,359	36,616	998,655	2,477,466
Manitoba—										
1940.....	60,514	4,088	8,490	8,673	300	2,288		25,568	1,361	111,282
1941.....	66,460		18,366		350	4,220		26,644	925	116,965
Saskatchewan—										
1940.....	42,357		29,463	275	875	6,398	295	13,228	7,930	100,821
1941.....	50,134		37,568		1,707	4,301	1,694	5,215	13,841	114,460
Alberta—										
1940.....	49,373	27,750	17,650	6,000	8,000	4,950	9,084		1,081	123,891
1941.....	50,233	25,000	12,328	8,000	10,112	550		641	3,541	110,405
British Columbia—										
1940.....	67,790	3,329	2,155	7,183	64		180	1,190	3,726	85,617
1941.....	79,575	5,717	2,276	9,565	125		240	2,000	4,613	101,111
Canada—										
1940.....	1,416,298	159,427	167,805	218,271	14,095	29,861	446,441	132,775	1,007,740	3,592,623
1941.....	1,582,016	82,899	186,269	148,294	22,326	31,820	384,265	120,681	1,314,923	3,883,496

Table 357.—Production in Canada and Imports of Rock, Wool 1932-1941

	Production	Imports	
		Pounds	\$
1932 (From October 12).....		309,791	5,301
1933.....		2,230,732	38,262
1934.....	1,709	2,987,611	69,267
1935.....	66,459	1,922,938	57,877
1936.....	265,472	2,391,504	101,592
1937.....	346,460	2,030,144	81,050
1938.....	396,261	1,337,954	45,109
1939.....	525,998	1,820,763	44,860
1940.....	935,229	2,082,589	52,233
1941.....	1,185,324	2,633,544	74,791

DIAMOND DRILLING INDUSTRY, 1942

Firms reported as actively engaged in the contract diamond drilling of Canadian mining properties in 1942 totalled 28. Operations were conducted in Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, British Columbia and the Northwest Territories. The total income received by the entire industry from contract drilling operations completed during the year under review amounted to \$3,147,532 compared with \$3,122,487 in 1941. The average number of employees in 1942 totalled 1,019 as against 1,455 in the preceding year. Salaries and wages paid in 1942 amounted to \$1,597,040. The total footage drilled throughout the Dominion during 1942 aggregated 2,960,364, of which 52 per cent was conducted in Ontario, 33 per cent in Quebec and 9 per cent in British Columbia.

The industry as a whole purchased, in 1942, borts, ballas, carbons, readysset and castset bits, etc. valued at \$634,233 compared with \$861,253 in 1941. Of the 1942 purchases, \$144,366 represented stones in the form of cast or readysset bits.

Equipment reported by the industry included 273 steam or air driven drills, 290 gas, oil and gasoline driven drills, and 2 electric drills.

Not included in this survey are data relating to the drilling of gas and oil wells and diamond drilling conducted by Canadian mining companies with their own personnel and equipment. Statistics relating to these particular operations are combined with those pertaining to the Canadian mining industry proper. In this regard, it is interesting to note that the use of diamond drills in stoping and other rock breaking operations in Canada has increased rapidly during recent years. Data on such operations in 1942 are not complete; however, partial returns show a total footage of 764,682 diamond drilled by mining operators proper.

According to particulars received by the Mining Journal, London, it was learned that electrically driven diamond drills operating in particularly hard formations in South Africa have developed penetration speeds up to 5 inches per minute where Jackhammers and drifters attained a maximum speed of 2-8 inches per minute. More recently, the program has been expanded to include the copper mines of Northern Rhodesia and the Belgian Congo, where the diamond drill is stated to have become well established for the breaking down of ore.

With the speeding up of the huge armament programs of the Allied Nations, manufacturers of diamond tools are working to capacity. Not the least encouraging aspect of the present position is that the Allied Nations are able to call on the combined resources of the three most important producers of industrial diamonds in the world—the Union of South Africa, the Congo, and Brazil. The enemy countries, in comparison, are in an extremely bad position regarding industrial diamonds.

Table 358.—Contract Diamond Drilling Operations in Canada, 1942

Province	Footage drilled	Income from drilling	Average number of employees	Total salaries and wages paid
		\$		\$
Nova Scotia.....	11,237	15,140	16	10,285
New Brunswick.....	25,171	34,056	20	23,392
Quebec.....	977,295	1,004,674	290	500,624
Ontario.....	1,536,954	1,554,116	553	815,821
Manitoba.....	91,999	146,309	29	54,143
Saskatchewan.....	11,335	11,902	4	9,566
Alberta.....				
British Columbia.....	279,152	360,450	100	177,724
Yukon.....				
Northwest Territories.....	27,221	20,885	7	5,485
Canada.....	2,960,364	3,147,532	1,019	1,597,040

Value of stones, readysset and castset bits purchased, 1942..... \$634,233

Table 359.—Contract Diamond Drilling Operations in Canada, 1941

Province	Footage drilled	Income from drilling	Number of employees	Total salaries and wages paid
		\$		\$
Nova Scotia.....	4,640	8,351	7	4,021
New Brunswick.....	759,506	895,169	365	400,870
Quebec.....	1,653,075	1,736,464	866	913,873
Ontario.....	19,400	23,606	36	9,089
Manitoba.....	25,543	24,805	14	8,970
Saskatchewan.....	3,288	3,017	1	458
Alberta.....	298,273	387,677	144	181,765
British Columbia.....				
Yukon.....	29,695	43,398	22	16,563
Northwest Territories.....				
Canada.....	2,793,420	3,122,487	(x) 1,455	1,535,609

Value of stones, readysset and castset bits purchased, 1941.....\$ 861,253

(x) Includes part-time employees.

EXPLANATORY NOTES

Method of Computing Quantities and Values of the Mineral Production of Canada in 1941.

Arsenic.—White arsenic (As_2O_3) shipped from Canadian smelters at its sales value.

Bismuth.—(a) Recoverable metal in silver-lead-bismuth bullion shipped to foreign smelters for refining at an arbitrary price; (b) Bismuth metal produced at Canadian smelters valued at the average New York price for the year.

Cadmium.—Smelter production valued at the average London price for the year.

Cobalt.—Cobalt content of the various cobalt products sold by the Ontario smelter producing these products added to the cobalt content of ores and residues exported for treatment in foreign smelters; the value given is the gross amount received by the shippers.

Copper.—(a) Recoverable copper in ores and concentrates exported valued at the average London price for the year, in Canadian funds; (b) Copper in blister copper made at Manitoba; Ontario and Quebec smelters valued at the average London price for the year in Canadian funds; (c) Copper in copper-nickel matte exported from Canadian smelters valued at an arbitrary price agreed upon between the Dominion Bureau of Statistics and the Ontario Department of Mines.

The price per pound used throughout 1941 to evaluate Canadian production was that agreed upon by the Canadian Producers and the British Government.

Gold.—Gold in bullion produced and the recoverable gold in all other Canadian mine products is valued at the standard rate of \$20.671834 per fine ounce until the end of 1930. For succeeding years, unless otherwise specified, gold is valued at the average price on world markets transposed to Canadian funds.

Lead.—Recoverable lead in ores exported from Canada added to lead contained in base bullion made at Trail, B.C., valued at the average London quotations for the year in Canadian funds. The average price used for 1941 was that agreed upon by contract between Canadian producers and the British Government.

Nickel.—(a) Refined and electrolytic nickel produced at Canadian refineries valued in Canadian funds at the average price obtained for such products sold during the year; (b) Nickel in oxides and salts sold from Canadian smelters and refineries at its total selling value in Canadian funds in the form in which it was sold; (c) Nickel in matte exported from Canada valued at an arbitrary figure agreed upon by the Ontario Department of Mines and the Dominion Bureau of Statistics (representative of the value of the nickel in matte form).

Platinum Group Metals.—Recoverable metals in smelter products and placer platinum at the average London price and transposed to Canadian funds.

Silver.—Silver bullion produced and the recoverable silver in other smelter products, and the recoverable silver in Canadian ores exported, at the average New York price in Canadian funds for the refined metal.

Tellurium and Selenium.—Smelter production valued at the average London price for the year.

Zinc.—Refined zinc produced by the Consolidated Mining and Smelting Co., Ltd., at Trail, B.C., and by the Hudson Bay Mining and Smelting Co., Ltd., Flin Flon, Manitoba, and the recoverable zinc in concentrates exported, valued at the average monthly price quoted in London, in Canadian funds.

The average price used for 1941 was that agreed upon by contract between Canadian producers and the British Government.

Coal.—Output tonnage evaluated prorata according to income from sales.

Other Non-Metallic Minerals, Clay Products and Structural Materials.—Shipments during the year at their respective sales values.

Imports.—Statements and quantities and values are based on the declarations of importers, as subsequently checked by government officials.

The value of imported merchandise is the fair market value or the price thereof when sold for home consumption in the principal markets of the country whence and at the time when the same were exported directly to Canada. The price and value of the goods in every case are stated as in condition packed ready for shipment, the fair value being shown in the currency of

the country of export, and the selling price to the purchaser in Canada shown in the actual currency in which the goods were purchased. In the case of goods that are the manufacture or produce of a foreign country, the currency of which is substantially depreciated, the value stated is the value that would be placed on similar goods manufactured or purchased in the United Kingdom and imported from that country, if such similar goods are made or produced there. If similar goods are not made or produced in the United Kingdom, the value stated is the value of similar goods made or produced in any European country, the currency of which is not substantially depreciated.

Exports.—Statements of quantities and values are based on the declaration of exporters as subsequently checked by government officials.

The value of exports of Canadian merchandise is the actual cost or the value at the time of exportation at the points in Canada whence originally shipped.

Weight.—Weight, where shown in imports and exports is the net weight of the goods, excluding the weight of the covers or receptacles, except in the cases of certain goods, as provided in the tariff.

The expression "ton" means 2,000 pounds, and cwt. 100 pounds, avoirdupois. Where other units of quantity are used, imperial standards apply.

Unless otherwise arranged, the data relating to the operations of less than three firms producing the same commodity or mineral are not published separately.

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